DRAFT REPORT

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

APPENDICES

APPENDIX A
SOIL GAS DATA

APPENDIX B
TEST BORING LOGS AND MONITORING WELL CONSTRUCTION DETAILS
HYDRAULIC CONDUCTIVITY DATA

APPENDIX C
QUALITY ASSURANCE/QUALITY CONTROL REPORT
DATA REVIEW CHECKLIST

APPENDIX D
APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

PREPARED FOR:

NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
PHILADELPHIA, PENNSYLVANIA

AUGUST 1991

ATLANTIC PROJECT NO.: 1256-10
NAVY CONTRACT NO. N62472-88-C-1294

ATLANTIC
ENVIRONMENTAL SERVICES, INC. 188 NORWICH AVENUE COLCHESTER, CONNECTICUT 06415 (203) 537-0751

APPENDIX A

SOIL GAS DATA

TORPEDO SHOP

TORPEDO SHOP AREA – SOIL GAS ANALYSIS RESULTS									
SAMPLE ID	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	ND	----	----	----	ND	----	----	----	----
SG2	ND	----	----	----	ND	----	----	----	----
SG3	Low	2.9	Benzene	79.6	ND	----	----	----	2.9
SG4	ND	----	----	----	ND	----	----	----	----
SG5	Low	3.5	Benzene	78.9	ND	----	----	----	3.5
SG6	ND	----	----	----	ND	----	----	----	----
SG7	Low	2.1	Benzene	79.8	ND	----	----	----	2.1
SG8	Trace	1.2	Unknown	110.8	Benzene	77.9	Trace	0.742	1.94
SG9	ND	----	----	----	ND	----	----	----	----
SG10	Trace	0.761	Benzene	75.1	ND	----	----	----	0.761
SG11	ND	----	----	----	ND	----	----	----	----
SG12	ND	----	----	----	ND	----	----	----	----
SG13	ND	----	----	----	ND	----	----	----	----
SG14	Trace	2.0	Unknown	404.7	ND	----	----	----	2.0
SG15	Low	2.2	Unknown	408.0	Unknown	56.3	Trace	0.761	7.62
					Unknown	84.3	Trace	1.9	
					Unknown	109.8	Trace	1.8	
					Unknown	257.0	Trace	0.579	
					Unknown	336.0	Trace	0.375	
SG16	ND	----	----	----	ND	----	----	----	----
SG17	Trace	1.2	Unknown	623.8	ND	----	----	----	1.2
SG18	Trace	0.614	Toluene	174.2	ND	----	----	----	0.614
SG19	Trace	1.2	Unknown	48.9	Toluene	179.2	Trace	0.370	2.09
					PCE	252.8	Trace	0.521	
SG20	Low	3.1	DCE	44.7	Unknown	50.1	Low	2.2	10.46
					Unknown	58.9	Low	3.1	
					Unknown	88.9	Trace	0.363	
					Toluene	185.2	Trace	1.7	

TORPEDO SHOP AREA – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE ID	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG21	High	693.0	Unknown (Toluene may be masked within peak)	170.4	Unknown	69.7	Trace	1.0	704.3
					Benzene	77.3	Low	4.0	
					Unknown	114.4	Trace	1.4	
					Unknown	122.8	Low	2.9	
					Unknown	572.8	Trace	2.0	
SG22	ND	----	----	----	ND	----	----	----	----
SG23	Low	16.5	Unknown	144.9	Benzene	78.5	Trace	1.5	29.3
					Unknown	115.3	Trace	0.549	
					Unknown	124.0	Trace	1.7	
					Toluene	177.0	Low	3.2	
					Unknown	575.8	Trace	0.707	
					Unknown	707.9	Low	4.4	
					Unknown	776.6	Trace	0.772	
SG24	Low	4.3	Toluene	175.2	Benzene	78.5	Trace	1.3	6.7
					Unknown	132.4	Trace	1.1	
SG25	Low	4.8	Unknown	709.7	Benzene	79.6	Trace	0.622	9.22
					Unknown	136.0	Trace	0.796	
					Toluene	178.2	Low	3.0	
SG26	Low	5.0	Unknown	733.9	DCE	46.5	Low	4.1	14.5
					Benzene	78.7	Trace	0.523	
					Unknown	137.6	Trace	0.629	
					Toluene	177.2	Trace	0.946	
					Unknown	322.3	Low	3.3	
SG27	Trace	0.867	DCE	47.9	Unknown	137.6	Trace	0.544	3.57
					Toluene	173.7	Trace	0.637	
					Unknown	700.7	Trace	0.846	
					Unknown	770.6	Trace	0.677	
SG28	Trace	2.0	Toluene	179.2	Benzene	80.5	Trace	1.0	4.73
					Unknown	138.8	Trace	0.596	
					Unknown	706.1	Trace	0.465	
					Unknown	774.6	Trace	0.669	

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values:
   ND = < 0.3 Vs.; Trace = 0.3 - 2.0 Vs.; Low = 2.1 - 50 Vs.; Moderate = 50.1 - 300 Vs.; and High = > 300 Vs.

GOSS COVE LANDFILL

GOSS COVE LANDFILL – SOIL GAS ANALYSIS RESULTS

SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	Low	6.5	PCE	259.8	Unknown	196.7	Trace	0.394	7.71
					Unknown	357.4	Trace	0.811	
SG2	Trace	1.5	Unknown	145.2	Unknown	54.5	Trace	0.774	4.25
					Benzene	78.9	Trace	0.436	
					Toluene	176.2	Trace	0.652	
					PCE	259.1	Trace	0.576	
					Unknown	359.2	Trace	0.308	
SG3	Trace	1.7	Toluene	176.2	Unknown	53.9	Trace	1.6	4.22
					Benzene	78.9	Trace	0.921	
SG4	Low	2.4	Benzene	79.1	Unknown	49.1	Trace	0.466	7.97
					Unknown	54.1	Trace	1.3	
					Unknown	59.9	Low	2.4	
					Toluene	176.7	Trace	1.4	
SG5	ND	----	----	----	ND	----	----	----	----
SG6	Trace	1.4	Unknown	54.7	Benzene	79.9	Trace	0.413	2.76
					Toluene	178.7	Trace	0.647	
					Unknown	361.2	Trace	0.304	
SG7	Trace	1.7	PCE	262.6	Unknown	59.1	Trace	0.359	2.06
SG8	Trace	1.4	Unknown	53.9	Benzene	80.2	Trace	0.467	2.74
					Toluene	181.7	Trace	0.555	
					Unknown	362.2	Trace	0.317	
SG9	Low	3.3	PCE	264.0	Unknown	53.5	Trace	0.985	4.69
					Unknown	363.2	Trace	0.413	
SG10	Trace	1.2	Unknown	53.7	ND	----	----	----	1.2
SG11	Trace	1.4	Toluene	177.2	Benzene	78.9	Trace	0.724	2.12
SG12	Low	4.2	Unknown	53.5	Benzene	79.3	Trace	1.0	6.88
					Toluene	177.7	Trace	1.0	
					Unknown	357.4	Trace	0.679	
SG13	Trace	1.1	Unknown	53.3	PCE	185.7	Trace	0.451	2.39
					Unknown	357.4	Trace	0.509	
					Unknown	741.5	Trace	0.330	
SG14	Trace	1.0	Unknown	54.1	Unknown	196.2	Trace	0.984	2.32
					Unknown	359.2	Trace	0.339	
SG15	Low	8.0	Unknown	212.4	DCE	48.5	Low	2.4	56.9
					Unknown	52.3	Low	3.9	
					Unknown	67.7	Trace	0.972	
					Benzene	78.8	Low	3.0	
					Unknown	131.6	Low	3.2	
					Unknown	158.8	Trace	0.306	
					Toluene	175.7	Low	3.6	
					Unknown	247.9	Low	2.6	
					PCE	266.1	Trace	1.7	
					Unknown	356.5	Low	8.0	

GOSS COVE LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG15 (continued)					Unknown	408.0	Low	3.1	
					Xylenes	438.8	Low	2.8	
					Unknown	516.1	Low	5.7	
					Xylenes	557.9	Low	3.9	
					Unknown	662.1	Low	3.8	
SG16	Low	13.3	DCE	51.3	Unknown	71.5	Trace	1.8	30.7
					Benzene	78.5	Low	6.8	
					Toluene	175.2	Low	8.0	
					Unknown	356.5	Trace	0.436	
					Xylenes	436.6	Trace	0.404	
SG17	Low	9.6	PCE	259.1	DCE	50.0	Low	12.5	46.12
					Benzene	78.7	Low	2.2	
					Unknown	89.8	Trace	0.756	
					TCE	102.4	Trace	0.482	
					Unknown	131.6	Low	2.9	
					Unknown	158.8	Trace	0.377	
					Toluene	174.7	Low	3.3	
					Unknown	211.8	Trace	2.0	
					Unknown	356.5	Low	7.6	
					Unknown	404.7	Trace	1.8	
					Xylenes	436.6	Trace	0.834	
					Unknown	514.8	Trace	0.471	
					Xylenes	555.1	Trace	0.413	
					Unknown	651.9	Trace	0.890	
SG18	Low	10.4	PCE	258.4	Benzene	78.7	Trace	1.7	17.99
					Unknown	136.4	Trace	0.789	
					Toluene	175.7	Low	5.1	
SG19	Low	5.6	PCE	267.5	Unknown	52.1	Low	3.5	14.45
					Benzene	84.1	Trace	0.352	
					Toluene	186.2	Low	5.0	
SG20	Low	6.9	Unknown	52.3	Unknown	71.1	Trace	1.1	15.36
					Benzene	78.3	Low	3.6	
					TCE	102.7	Trace	0.303	
					Unknown	140.4	Trace	0.559	
					Toluene	175.2	Low	2.9	
SG21	Trace	1.9	Unknown	54.7	DCE	48.7	Trace	0.479	3.6
					Benzene	77.9	Trace	0.335	
					Unknown	195.7	Trace	0.886	
SG22	ND	----	----	----	ND	----	----	----	
SG23	Low	6.3	Toluene	181.7	Unknown	49.6	Low	9.8	69.67
					Benzene	77.3	Low	2.5	
					Unknown	130.4	Trace	0.699	

GOSS COVE LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG23 (continued)					Unknown	139.6	Trace	0.590	
					Unknown	158.4	Trace	0.583	
					Unknown	210.6	Trace	6.1	
					Unknown	244.4	Trace	5.4	
					Unknown	352.9	Low	18.3	
					Unknown	398.2	Low	4.7	
					Unknown	510.9	Low	5.8	
					Xylenes	541.1	Low	5.2	
					Unknown	641.7	Low	3.7	
SG24	Low	8.3	Unknown	52.1	Unknown	70.5	Trace	1.0	19.13
					Benzene	77.9	Low	4.2	
					Unknown	138.0	Trace	0.551	
					Unknown	158.4	Trace	0.332	
					Toluene	173.7	Low	4.0	
					Unknown	352.0	Trace	0.382	
					Xylenes	431.0	Trace	0.368	
SG25	ND	----	----	----	ND	----	----	----	----
SG26	Low	18.3	Unknown	315.5	Unknown	64.1	Low	2.9	64.5
					Benzene	70.5	Low	9.2	
					Unknown	85.0	Low	3.6	
					TCE	92.2	Low	7.2	
					Unknown	117.1	Low	3.3	
					Unknown	187.7	Low	4.4	
					Unknown	219.6	Trace	1.9	
					PCE	232.2	Trace	1.3	
					Xylenes	455.6	Low	2.5	
					Unknown	494.0	Low	5.1	
					Unknown	580.0	Low	3.5	
					Unknown	702.5	Low	1.3	
SG27	Trace	0.888	Xylenes	459.2	Benzene	70.9	Trace	0.588	4.24
					Unknown	83.5	Trace	0.366	
					PCE	238.8	Trace	0.531	
					Xylenes	399.2	Trace	1.1	
					Unknown	733.9	Trace	0.763	
SG28	Low	2.1	Unknown	320.5	Unknown	44.1	Trace	1.4	9.40
					Unknown	48.5	Trace	2.0	
					Benzene	71.9	Trace	0.667	
					PCE	239.5	Trace	0.478	
					Unknown	368.2	Trace	1.2	
					Xylenes	388.2	Trace	1.1	
					Unknown	589.3	Trace	0.457	

GOSS COVE LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG29	ND	----	----	----	ND	----	----	----	----
SG30	Trace	1.1	TCE	93.4	Unknown	43.7	Trace	0.461	4.262
					Unknown	48.9	Trace	0.628	
					Unknown	52.5	Trace	0.505	
					Unknown	87.1	Trace	1.0	
					Unknown	102.4	Trace	0.568	
SG31	Low	3.0	Unknown	76.9	ND	----	----	----	3.0
SG32	Trace	0.776	Unknown	601.5	ND	----	----	----	0.776
SG33	ND	----	----	----	ND	----	----	----	----
SG34	Low	3.5	Unknown	73.5	Unknown	248.6	Trace	0.486	3.99
SG35	ND	----	----	----	ND	----	----	----	----
SG36	Low	15.0	Benzene	72.4	Unknown	45.1	Low	2.2	38.50
					Unknown	48.8	Low	9.1	
					Unknown	65.7	Low	2.6	
					TCE	94.6	Low	4.6	
					Unknown	323.2	Trace	1.3	
					Xylenes	395.2	Low	2.8	
					Xylenes	464.0	Trace	0.371	
					Unknown	601.5	Trace	0.527	
SG37	Trace	2.0	Unknown	48.7	Unknown	44.5	Trace	1.6	5.33
					Unknown	85.0	Trace	1.4	
					Unknown	325.0	Trace	0.332	
SG38	ND	---	---	---	ND	---	---	---	---
SG39	ND	---	---	---	ND	---	---	---	---
SG40	Low	7.6	Unknown	78.1	Unknown	48.5	Trace	1.5	19.9
					Unknown	53.3	Low	4.2	
					Benzene	70.3	Low	3.9	
					Unknown	102.4	Low	2.7	
SG41	Low	9.5	Unknown	78.5	Unknown	48.9	Trace	1.7	22.4
					Unknown	53.5	Low	5.5	
					Benzene	71.1	Low	2.2	
					Unknown	102.4	Low	3.5	
SG42	ND	---	---	---	ND	---	---	---	---
SG43	Low	6.8	Unknown	603.1	Unknown	47.7	Trace	1.7	37.4
					Unknown	78.5	Trace	1.8	
					Unknown	252.1	Trace	1.8	
					Unknown	336.7	Low	5.5	
					Xylenes	382.2	Low	3.3	
					Unknown	409.1	Low	4.2	
					Xylenes	459.2	Low	6.3	
					Unknown	514.8	Low	6.0	
SG44	ND	---	---	---	ND	---	---	---	---

GOSS COVE LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG45	High	+300 (Offscale)	Unknown	approx 330	Unknown	47.3	Low	2.1	403.7
					Unknown	77.9	Low	3.3	
					Unknown	88.3	Trace	0.997	
					Unknown	130.8	Trace	0.659	
					Unknown	145.6	Low	3.6	
					Toluene	157.2	Low	3.1	
					Unknown	166.2	Low	2.6	
					Unknown	176.2	Low	3.9	
					Unknown	204.2	Low	31.8	
					Unknown	237.4	Moderate	51.6	
SG46	Low	31.2	Unknown	599.9	Unknown	78.1	Trace	0.539	94.12
					Unknown	169.7	Trace	0.641	
					Unknown	205.8	Trace	0.543	
					Unknown	249.3	Low	2.3	
					Unknown	334.9	Low	12.0	
					Xylenes	380.2	Low	15.7	
					Unknown	510.9	Low	31.2	
SG47	Low	7.0	Xylenes	400.3	Unknown	48.1	Low	2.9	49.13
					Unknown	51.9	Low	2.4	
					Unknown	56.7	Low	4.6	
					Benzene	69.5	Low	3.0	
					Unknown	77.5	Low	3.9	
					Unknown	88.0	Low	2.3	
					Unknown	168.2	Trace	1.1	
					Unknown	250.0	Trace	0.829	
					Unknown	333.0	Low	5.1	
					Unknown	379.2	Low	4.1	
					Xylenes	455.6	Low	4.5	
					Unknown	503.1	Low	4.9	
					Unknown	593.8	Low	2.5	
SG48	ND	----	----	----	ND	----	----	----	----
SG49	Trace	1.1	Toluene	131.6	Benzene	61.7	Trace	0.864	2.42
					TCE	80.8	Trace	0.451	
SG50	Low	3.4	Benzene	61.3	TCE	81.1	Low	3.0	7.33
					Toluene	132.0	Trace	0.933	
SG51	ND	----	----	----	ND	----	----	----	----
SG52	ND	----	----	----	ND	----	----	----	----
SG53	Trace	0.314	Toluene	134.8	ND	----	----	----	0.314
SG54	High	1300	Offscale (Unknown)	57.5	Unknown	113.5	Low	5.4	1317.5
					Toluene	131.6	Low	4.7	
					Unknown	153.9	Low	3.1	
					Unknown	210.0	Low	2.1	
					Unknown	289.1	Low	2.2	

GOSS COVE LANDFILL - SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG55	ND	----	----	----	ND	----	----	----	----
SG56	Trace	2.0	Toluene	137.2	Benzene	63.7	Trace	0.568	2.568
SG57	Trace	0.571	Toluene	134.8	Benzene	62.7	Trace	0.358	0.929
SG58	ND	----	----	----	ND	----	----	----	----
SG59	ND	----	----	----	ND	----	----	----	----
SG60	ND	----	----	----	ND	----	----	----	----
SG61	ND	----	----	----	ND	----	----	----	----
SG62	ND	----	----	----	ND	----	----	----	----
SG63	Trace	1.9	Toluene	134.9	Benzene	62.7	Trace	0.865	3.53
					Unknown	82.6	Trace	0.769	
SG64	Moderate	115.3	Unknown	812.9	Benzene	62.7	Trace	0.434	259.5
					Toluene	132.8	Trace	1.3	
					Unknown	155.2	Trace	0.350	
					PCE	192.2	Trace	1.5	
					Unknown	289.1	Low	14.3	
					Ethyl Benzene	331.3	Low	14.4	
					Unknown	424.5	Low	14.8	
					Unknown	464.8	Low	21.0	
					Unknown	545.5	Low	30.6	
					Unknown	615.9	Low	20.9	
					Unknown	665.5	Low	24.7	

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values: ND=<0.3 Vs.; Trace=0.3-2.0 Vs.; Low=2.1-50 Vs.; Moderate=50.1-300 Vs.; High=>300 Vs.

FORMER GASOLINE STATION

FORMER GASOLINE STATION – SOIL GAS ANALYSIS RESULTS									
SAMPLE ID	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	ND	----	----	----	ND	----	----	----	----
SG2	ND	----	----	----	ND	----	----	----	----
SG3	ND	----	----	----	ND	----	----	----	----
SG4	ND	----	----	----	ND	----	----	----	----
SG5	ND	----	----	----	ND	----	----	----	----
SG6	ND	----	----	----	ND	----	----	----	----
SG7	ND	----	----	----	ND	----	----	----	----
SG8	ND	----	----	----	ND	----	----	----	----
SG9	ND	----	----	----	ND	----	----	----	----
SG10	ND	----	----	----	ND	----	----	----	----
SG11	Low	21.8	Toluene	132.0	Unknown	55.1	Trace	0.657	70.3

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values:
   ND = < 0.3 Vs.; Trace = 0.3 - 2.0 Vs.; Low = 2.1 - 50 Vs.; Moderate = 50.1 - 300 Vs.; and High = > 300 Vs.
4. Clay sealer (Play-Doh) was found to create unwanted peaks on GC. All these samples were affected. Clay sealer replaced with natural clay for the rest of Navy Soil Gas. These results are still usable because the clay peaks did not interfere with the chromatogram areas of interest. This was the first time these peaks due to clay at the surface were ever noticed, probably due to the shallow sampling depth possible at the former gasoline station. (See report for details.)

AREA A LANDFILL

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS

SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	ND	----	----	----	ND	----	----	----	----
SG2	ND	----	----	----	ND	----	----	----	----
SG3	ND	----	----	----	ND	----	----	----	----
SG4	Trace	0.748	Benzene	79.1	ND	----	----	----	0.748
SG5	ND	----	----	----	ND	----	----	----	----
SG6	ND	----	----	----	ND	----	----	----	----
SG7	Trace	0.391	Benzene	80.5	ND	----	----	----	0.391
SG8	Trace	0.887	Benzene	80.2	ND	----	----	----	0.887
SG9	ND	----	----	----	ND	----	----	----	----
SG10	ND	----	----	----	ND	----	----	----	----
SG11	Trace	0.338	Benzene	79.9	ND	----	----	----	0.338
SG12	ND	----	----	----	ND	----	----	----	----
SG13	ND	----	----	----	ND	----	----	----	----
SG14	ND	----	----	----	ND	----	----	----	----
SG15	ND	----	----	----	ND	----	----	----	----
SG16	Low	6.4	Benzene	76.7	111-TCEa Toluene	69.5 168.7	Low Trace	2.1 1.4	9.9
SG17	ND	----	----	----	ND	----	----	----	----
SG18	ND	----	----	----	ND	----	----	----	----
SG19	ND	----	----	----	ND	----	----	----	----
SG20	ND	----	----	----	ND	----	----	----	----
SG21	ND	----	----	----	ND	----	----	----	----
SG22	ND	----	----	----	ND	----	----	----	----
SG23	ND	----	----	----	ND	----	----	----	----
SG24	Low	6.4	Unknown	53.1	111-TCEa Benzene TCE	70.3 77.3 101.2	Low Low Low	2.4 4.7 4.9	18.4
SG25	ND	----	----	----	ND	----	----	----	----
SG26	ND	----	----	----	ND	----	----	----	----
SG27	ND	----	----	----	ND	----	----	----	----
SG28	ND	----	----	----	ND	----	----	----	----
SG29	ND	----	----	----	ND	----	----	----	----
SG30	ND	----	----	----	ND	----	----	----	----
SG31	ND	----	----	----	ND	----	----	----	----
SG32	Trace	0.332	Benzene	79.9	ND	----	----	----	0.332
SG33	Low	2.7	Unknown	281.1	ND	----	----	----	2.7
SG34	ND	----	----	----	ND	----	----	----	----
SG35	ND	----	----	----	----	----	----	----	----
SG36	Low	33.5	Unknown	317.9	TCE	103.3	Trace	0.496	33.996
SG37	Trace	0.484	Benzene	78.7	ND	----	----	----	0.484
SG38	ND	----	----	----	ND	----	----	----	----

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG39	ND	----	----	----	ND	----	----	----	----
SG40	High	6700	Unknown	460.4	Unknown	76.3	Low	36.4	7621.5
					Unknown	156.4	Low	11.3	
					Unknown	135.9	Moderate	55.4	
					Unknown	651.6	Moderate	170	
					Toluene	233.5	High	557	
					Benzene	94.4	Moderate	79.5	
					TCE	113.4	Low	11.9	
SG41	ND	----	----	----	ND	----	----	----	----
SG42	Low	10.8	Benzene	74.7	Unknown	107.8	Low	7.8	22.3
					Toluene	163.7	Low	2.2	
					TCE	99.1	Trace	1.5	
SG43	Moderate	107	Unknown	328.3	Unknowns	126.0	Low	5.6	143.9
					Unknowns	199.2	Low	11.9	
					DCE	45.9	Low	4.4	
					Xylenes	403.6	Low	15	
SG44	ND	----	----	----	ND	----	----	----	----
SG45	Moderate	151.5	Benzene	75.4	Unknown	123.6	Low	4.7	160.4
					Unknown	137.6	Low	4.2	
SG46	High	536	Unknown	335.9	Unknown	214.6	High	298	1021.7
					Benzene	87.2	Moderate	97.8	
					Unknown	462.8	Low	34	
					DCE	50.3	Low	17.9	
					TCE	123.2	Low	24	
					Xylenes	401.4	Low	14	
SG47	ND	----	----	----	ND	----	----	----	
SG48	ND	----	----	----	ND	----	----	----	
SG49	High	1200	Unknown	64.5	Toluene	195.1	Low	32.9	1329.1
					Unknown	322.7	Low	38.6	
					Unknown	371.2	Low	14.4	
					Unknown	127.3	Low	43.2	
SG50	High	329.1	Unknown	384.8	Benzene	84.5	Moderate	78	574.1
					Unknown	320.2	Moderate	54.9	
					TCE	105.3	Low	9.7	
					Unknown	122.6	Low	26	
					Unknown	193.2	Low	37	
					Unknown	504.4	Low	39.4	
SG51	Low	9	DCE	46.6	Benzene	74.9	Trace	2.0	26.6
					Unknown	53.5	Low	5.5	
					Unknown	64.7	Low	3.1	
					Unknown	88.9	Low	2.7	
					Unknown	326.8	Low	4.3	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG52	ND	----	----	----	ND	----	----	----	
SG53	Low	37.4	Unknown	84.5	TCE	94.3	Low	14.4	138.9
					Unknown	115.3	Low	12.7	
					Unknown	130.3	Low	13.0	
					Unknown	184.9	Low	36.5	
					Unknown	319.3	Low	24.9	
SG54	High	301	Unknown	318.7	approx. DCE	43.7	Low	8.4	483
					Benzene	75.7	Low	24	
					TCE	93.1	Low	9.6	
					Toluene	156.4	Low	5.0	
					approx. PCE	222.6	Low	30	
					Xylenes	397.2	Moderate	105	
SG55	Moderate	233.4	Unknown	478.8	Unknown	319.1	Moderate	132.8	676.9
					Unknown	83.5	Moderate	78.9	
					Unknown	580.4	Moderate	83.7	
					Unknown	102.4	Low	8.2	
					Unknown	119.3	Low	18.9	
					Unknown	132.4	Low	6.9	
					Unknown	145.2	Low	4.2	
					Unknown	189.0	Low	36.3	
					Unknown	366.2	Low	17.2	
					Toluene	155.5	Low	5.1	
					Xylenes	391.0	Moderate	51.3	
SG56	Low	11.5	Unknown	501.8	Unknown	52.7	Low	3.3	37.6
					Unknown	64.3	Low	2.4	
					Unknown	190.7	Low	1.5	
					Unknown	320.5	Low	6.5	
					Unknown	366.2	Low	3.4	
					approx. Benzene	77.3	Low	4.4	
					Xylenes	393.2	Low	4.6	
SG57	Moderate	78.3	Unknown	315.4	Xylenes	387.3	Moderate	56.8	182.3
					approx. Benzene	77.1	Low	26.4	
					approx. TCE	91.1	Low	7.6	
					Toluene	156.0	Low	3.0	
					approx. PCE	237.0	Low	10.2	
SG58	Low	15.0	TCE	94.2	Unknown	62.9	Low	5.2	45.1
					Unknown	76.9	Low	4.3	
					Unknown	83.5	Low	8.6	
					Unknown	120.8	Low	6.7	
					Unknown	135.2	Low	3.4	
					Unknown	145.6	Low	3.1	
					Unknown	191.7	Low	5.1	
					Toluene	156.0	Low	2.8	
					PCE	224.4	Trace	0.897	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG59	High	300	approx. Xylenes	400.3	Unknown	46.3	Low	9.6	870.3
					Unknown	49.9	Low	9.0	
					Unknown	54.9	Low	22.2	
					Unknown	64.7	Low	9.6	
					Unknown	79.6	Low	15.0	
					Unknown	124.4	Low	8.4	
					Unknown	326.8	Moderate	61.8	
					Unknown	371.2	Moderate	54.0	
					Unknown	474.8	Moderate	140.4	
					Unknown	505.7	Moderate	115.8	
					Unknown	596.8	Moderate	78	
					Unknown	658.7	Low	37.8	
					approx. TCE	96.7	Trace	1.3	
					Toluene	156.8	Low	3.2	
					PCE	229.2	Low	4.2	
SG60	High	1000	Unknown	423.0	Unknown	63.1	Low	6.9	1239.9
					Unknown	86.8	Low	7.6	
					Unknown	105.4	Low	18.6	
					Unknown	122.2	Low	26.5	
					Unknown	193.7	Low	10.0	
					Unknown	325.0	Low	29.5	
					Unknown	500.8	Low	46.0	
					Unknown	595.3	Low	27.0	
					Unknown	663.8	Low	20.6	
					Unknown	720.6	Low	33.1	
					approx. Benzene	78.3	Low	5.9	
					approx. TCE	95.2	Low	4.1	
					Toluene	155.6	Trace	1.9	
					PCE	226.8	Trace	0.344	
SG61	Trace	1.2	Benzene	73.9	Unknown	84.1	Trace	0.632	
					Xylene	398.2	Trace	1.2	3.0
SG62	ND	----	----	----	ND	----	----	----	----
SG63	ND	----	----	----	ND	----	----	----	----
SG64	Trace	1.0	approx. TCE	99.1	Unknown	325.9	Trace	0.510	1.51
SG65	ND	----	----	----	ND	----	----	----	----
SG66	ND	----	----	----	ND	----	----	----	----
SG67	Moderate	50.9	Xylenes	400.1	Unknown	55.7	Low	3.8	227.0
					Unknown	122.1	Low	9.9	
					Unknown	196.7	Low	7.0	
					Unknown	247.9	Low	2.4	
					Unknown	328.6	Low	23.7	
					Unknown	374.2	Low	16.2	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG67 continued					Unknown	477.2	Low	26.5	
					Unknown	514.8	Low	27.4	
					Unknown	607.9	Low	20.5	
					Unknown	667.2	Low	12.0	
					Unknown	733.9	Low	13.5	
					approx. Benzone	77.2	Low	8.0	
					approx. TCE	96.1	Trace	0.316	
					Toluene	156.1	Low	3.5	
					approx. PCE	231.0	Low	1.4	
SG68	High	1000	approx. Xylene	424.2	Unknown	86.2	Low	34.2	1720.3
					Unknown	107.2	Low	9.9	
					Unknown	125.7	Low	34.9	
					Unknown	144.8	Low	4.2	
					Unknown	155.7	Low	5.7	
					Unknown	198.7	Low	39.8	
					Unknown	251.4	Low	13.7	
					Unknown	329.2	Moderate	68.6	
					Unknown	513.5	Low	48.9	
					Unknown	609.5	Low	28.5	
					Unknown	674.0	Low	13.7	
					DCE	44.1	High	403.0	
					Toluene	164.2	Low	7.4	
					approx. PCE	234.0	Low	7.8	
SG69	ND	----	----	----	ND	----	----	----	----
SG70	Moderate	57.7	Unknown	332.5	Unknown	47.5	Low	3.7	176.8
					Unknown	52.1	Low	6.2	
					Unknown	67.3	Low	3.6	
					Unknown	80.9	Low	10	
					Unknown	126.8	Low	23.6	
					Unknown	145.2	Low	1.7	
					Unknown	156.8	Low	1.0	
					Unknown	167.2	Low	3.4	
					Unknown	201.3	Low	25.4	
					Unknown	235.8	Low	5.7	
					Unknown	252.1	Low	3.4	
					Unknown	381.2	Low	9.9	
					Unknown	419.0	Low	5.5	
					Unknown	482.3	Low	16.0	
SG71	High	971.2	Unknown	453.6	Unknown	63.1	Low	7.2	1604.5
					Unknown	86.6	Moderate	54.0	
					Unknown	127.1	Low	20.0	
					Unknown	194.3	Moderate	104.3	
					Unknown	228.1	Low	8.0	
					Unknown	328.1	Moderate	291.0	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	
SG71 continued					Unknown	600.0	Moderate	81.6	
					Unknown	677.4	Low	21.6	
					Unknown	737.7	Low	37.4	
					approx. Toluene	155.8	Trace	1.0	
					approx. PCE	247.2	Low	7.2	
SG72	Low	2.1	Benzene	74.7	Xylene	406.9	Trace	1.3	3.4
SG73	High	>300	Unknown	----	Unknown	64.1	Low	5.9	
					Unknown	85.2	Moderate	79.9	575.3
					Unknown	105.6	Low	10.8	
					Unknown	126.7	Moderate	51.4	
					Unknown	195.4	Moderate	103.7	
					Toluene	156.1	Trace	1.3	
					approx. PCE	233.1	Low	20.2	
SG74	Low	6.8	Xylenes	404.7	Benzene	74.5	Low	2.3	
					Unknown	68.3	Trace	0.795	11.39
					Unknown	331.3	Trace	1.5	
SG75	Trace	1.3	Xylenes	404.7	Unknown	329.5	Trace	0.681	1.981
SG76	Low	8.3	Unknown	79.6	DCE	46.1	Trace	1.1	64.1
					Unknown	51.1	Trace	1.2	
					Unknown	55.9	Low	3.1	
					Unknown	64.9	Low	2.5	
					TCE	97.9	Low	2.2	
					Unknown	108.4	Low	2.3	
					Unknown	126.0	Low	4.4	
					Unknown	145.2	Low	2.9	
					Unknown	157.2	Trace	1.1	
					Unknown	200.4	Low	2.1	
					Unknown	336.7	Low	7.5	
					Unknown	382.6	Low	4.9	
					approx. Xylenes	419.0	Low	3.3	
					Unknown	479.7	Low	4.9	
					Unknown	527.1	Low	6.6	
					Unknown	615.9	Low	4.2	
					Unknown	684.5	Trace	1.5	
SG77	High	389.8	Xylenes	405.2	approx. DCE	51.1	Low	15.6	566.6
					Unknown	64.3	Low	6.4	
					Benzene	79.2	Low	21.4	
					Unknown	97.6	Low	3.6	
					Unknown	108.4	Low	5.0	
					Unknown	125.0	Low	9.6	
					Unknown	145.2	Low	4.9	
					Unknown	156.8	Low	4.0	
					Unknown	201.0	Low	17.6	
					Unknown	235.2	Low	5.3	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG77 continued					PCE	251.4	Low	6.5	
					Unknown	336.7	Low	19.7	
					Unknown	483.6	Low	16.7	
					Unknown	521.5	Low	20.1	
					Unknown	617.5	Low	14.9	
					Unknown	682.5	Low	5.5	
SG78	Moderate	139.7	Xylenes	413.1	DCE	45.6	Low	3.1	219.4
					Unknown	49.9	Low	2.1	
					Unknown	54.4	Low	5.8	
					Unknown	65.5	Low	5.4	
					Benzene	78.3	Low	16.7	
					Unknown	97.3	Low	2.1	
					Unknown	108.7	Low	3.3	
					Unknown	126.4	Low	6.5	
					Unknown	145.2	Trace	1.3	
					Unknown	156.8	Trace	1.1	
					Unknown	201.6	Low	4.9	
					Unknown	336.7	Low	9.0	
					Unknown	527.1	Low	9.1	
					Unknown	619.1	Low	5.0	
					Unknown	688.1	Low	2.7	
					Unknown	747.2	Trace	1.6	
SG79	High	316.0	Unknown	439.8	Unknown	65.5	Low	5.9	804.8
					Benzene	79.0	Low	21.5	
					TCE	98.2	Low	2.6	
					Unknown	109.9	Low	7.3	
					Unknown	126.5	Low	10.9	
					Unknown	145.2	Low	2.2	
					Unknown	156.4	Low	3.9	
					Unknown	201.7	Low	32.8	
					Unknown	238.2	Low	6.6	
					Unknown	254.9	Low	6.5	
					Unknown	331.7	Moderate	262.6	
					Unknown	526.8	Moderate	61.9	
					Unknown	625.5	Low	33.3	
					Unknown	697.1	Low	30.8	
SG80	Low	4.2	Benzene	76.5	Unknown	46.7	Trace	2.0	16.4
						50.9	Low	3.8	
						67.1	Low	3.2	
						337.6	Trace	0.726	
						417.9	Low	2.1	
						623.9	Trace	0.393	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG81	Low	13.1	Unknown	342.1	Unknown	48.5	Low	7.1	77.3
					Unknown	55.3	Low	5.8	
					Unknown	66.5	Low	5.1	
					Unknown	81.7	Low	6.8	
					Unknown	110.2	Trace	0.377	
					Unknown	128.4	Low	3.0	
					Unknown	145.2	Trace	1.3	
					Unknown	156.8	Trace	0.476	
					Unknown	205.2	Low	8.6	
					PCE	238.8	Low	2.4	
					Unknown	342.1	Low	13.1	
					Unknown	388.2	Low	5.9	
					Unknown	491.4	Low	4.4	
					Unknown	532.7	Low	4.1	
					Unknown	623.9	Low	2.2	
					Unknown	693.5	Trace	0.350	
SG82	High	6200	Unknown	439.1	Unknown	44.3	Moderate	248.3	7233.9
					Unknown	95.9	Moderate	113.8	
					Unknown	133.9	Moderate	69.9	
					Unknown	155.7	Low	9.3	
					Unknown	221.0	High	435.7	
					Unknown	618.3	Moderate	125.5	
					Unknown	695.3	Low	31.4	
SG83	Low	21.3	Benzene	78.2	Unknown	66.1	Low	4.9	50.4
						100.0	Low	3.8	
						108.7	Low	2.7	
						128.0	Low	6.0	
						145.2	Low	3.6	
						157.2	Trace	1.0	
						168.7	Low	3.4	
						205.8	Trace	1.6	
						340.3	Trace	1.6	
						419.0	Trace	0.477	
SG84	High	One large peak, unknown constituents, there was no duplicate run to separate peaks.							>300
SG85	Low	17.9	Xylenes	417.9	DCE	46.9	Trace	1.3	64.1
					Unknown	55.9	Low	5.8	
					Unknown	66.1	Trace	1.8	
					Benzene	76.5	Low	2.7	
					Unknown	87.4	Low	2.7	
					TCE	100.6	Low	2.1	
					Unknown	109.6	Trace	1.6	
					Unknown	127.6	Trace	1.4	
					Unknown	145.2	Low	2.2	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG85 continued					Toluene	168.2	Low	11.6	
					Unknown	204.0	Low	2.6	
					Unknown	340.3	Low	2.5	
					Unknown	499.2	Low	6.9	
					Unknown	623.9	Trace	1.0	
SG86	High	5000	Unknown	443.2	Unknown	66.4	Low	9.4	5361.5
					Unknown	96.1	Moderate	158.4	
					Unknown	146.7	Moderate	59.6	
					Unknown	226.8	Moderate	105.3	
					Unknown	651.9	Low	28.8	
SG87	High	10300	Unknown	479.2	approx. DCE	48.8	Low	3.4	
					Unknown	52.2	Low	2.8	
					Unknown	57.7	Low	3.4	10655
					Unknown	70.3	Low	3.3	
					Unknown	82.5	Low	26.5	
					approx. TCE	104.8	Trace	0.907	
					Unknown	117.1	Low	2.8	
					Unknown	135.1	Low	31.6	
					Unknown	156.8	Low	2.1	
					Unknown	182.2	Low	6.9	
					Unknown	220.5	Moderate	94.4	
					Unknown	260.5	Low	15.1	
					Unknown	279.0	Low	38.0	
					Unknown	698.6	Moderate	123.4	
SG88	High	6600	Unknown	488.7	Unknown	49.5	Trace	2.0	6904.6
					Unknown	56.8	Low	10.6	
					Unknown	71.5	Low	2.9	
					Unknown	88.3	Low	7.4	
					Unknown	108.4	Trace	1.3	
					Unknown	121.2	Trace	1.8	
					Unknown	139.5	Low	23.4	
					Unknown	157.2	Low	3.0	
					Unknown	190.6	Moderate	76.4	
					Unknown	226.8	Moderate	55.1	
					Unknown	279.9	Moderate	120.7	
SG89	High	858.1	Unknown	452.9	Unknown	52.1	Low	18.5	1075
					Unknown	138.1	Low	18.5	
					Unknown	186.7	Low	13.0	
					Unknown	225.4	Low	34.6	
					Unknown	289.1	Low	13.5	
					Unknown	379.2	Low	34.4	
					Unknown	555.1	Low	28.4	
					Unknown	590.8	Low	22.9	
					Unknown	698.9	Low	33.1	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG90	Moderate	96.6	Xylenes	406.1	approx. DCE	43.4	Moderate	187.5	581.2
					Unknown	83.2	Low	26.1	
					approx. TCE	96.4	Low	3.5	
					Unknown	106.6	Low	10.4	
					Unknown	124.1	Low	24.2	
					Unknown	197.1	Low	38.1	
					PCE	248.6	Low	6.8	
					Unknown	326.6	Moderate	65.5	
					Unknown	474.7	Low	47.7	
					Unknown	516.6	Moderate	50.7	
					Unknown	612.7	Low	24.4	
SG91	High	3100	Unknown	378.6	approx. DCE	43.9	High	341.7	3756.2
					Unknown	87.2	moderate	61.8	
					Unknown	109.5	Low	10.1	
					Unknown	127.9	Low	24.7	
					Toluene	170.2	Low	11.1	
					Unknown	202.2	Moderate	59.6	
					Unknown	240.9	Low	6.5	
					Unknown	260.5	Low	15.5	
					Unknown	497.7	Moderate	51.3	
					Unknown	535.5	Low	32.8	
					Unknown	641.7	Low	41.1	
SG92	Moderate	239.7	Unknown	519.0	Unknown	84.8	Low	32.2	560.3
					TCE	99.7	Low	4.5	
					Unknown	110.1	Low	13.2	
					Unknown	127.3	Low	14.2	
					Toluene	169.7	Trace	0.536	
					Unknown	204.1	Low	19.5	
					PCE	241.6	Trace	0.485	
					Unknown	339.4	Low	38.2	
					Unknown	394.2	Low	14.1	
					Xylenes	418.7	Moderate	57.3	
					Unknown	627.4	Moderate	109.6	
					Unknown	709.7	Low	16.8	
SG93	Trace	1.1	DCE	48.5	Benzene	75.9	Trace	0.624	2.2
					Toluene	171.7	Trace	0.485	
SG94	Trace	0.712	Unknown	85.6	Unknown	53.1	Trace	0.457	1.9
					Unknown	145.2	Trace	0.694	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG95	Low	36.6	Benzene	79.4	Unknown	63.7	Low	5.8	101
					TCE	96	Low	9.3	
					Unknown	124	Low	5.3	
					Unknown	137.2	Low	2.5	
					Unknown	145.2	Trace	2.0	
					Unknown	157.2	Low	3.3	
					Toluene	175.2	Trace	1.2	
					Unknown	200.4	Low	11.7	
					Unknown	235.8	Low	4.8	
					Unknown	342.1	Low	9.7	
					Unknown	390.2	Low	2.9	
					Unknown	496.6	Low	2.2	
					Unknown	538.3	Low	2.2	
					Unknown	631.9	Trace	1.5	
SG96	Trace	1.6	Toluene	167.7	DCE	45.7	Trace	1.0	
					Benzene	74.1	Trace	0.602	3.8
					Unknown	145.2	Trace	0.560	
SG97	Trace	0.888	DCE	46.3	Unknown	145.2	Trace	0.441	1.3
SG98	Trace	1.8	Unkown	180.7	DCE	42.3	Trace	1.2	6.2
					Unknown	50.9	Trace	0.799	
					approx. Benzene	81.4	Trace	0.707	
					Unknown	144.8	Trace	1.4	
					Unknown	158.8	Trace	0.338	
SG99	Low	3.9	DCE	42.9	Unknown	51.5	Low	4.7	13.7
					Unknown	82.6	Trace	0.541	
					Unknown	182.7	Trace	0.684	
					Unknown	217.2	Trace	0.769	
					Unknown	358.3	Low	1.7	
					Unknown	513.5	Trace	0.650	
					Unknown	646.8	Trace	0.777	
SG100	Low	5.7	DCE	46.5	Benzene	75.3	Trace	2.0	14.5
					Unknown	131.2	Trace	0.707	
					Unknown	145.2	Trace	0.801	
					Toluene	166.2	Low	4.7	
					Unknown	492.7	Trace	0.561	
SG101	Trace	0.951	DCE	46.1	Benzene	73.9	Trace	0.802	2.24
					Unknown	145.2	Trace	0.488	
SG102	Trace	0.947	Toluene	158.0	Unknown	127.6	Trace	0.366	1.9
					Unknown	422.3	Trace	0.591	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG103	Low	24.6	Unknown	541.1	DCE	45	Trace	1.6	171.3
					Benzene	75.5	Low	10.5	
					TCE	96.4	Trace	0.311	
					Unknown	124.4	Low	4.2	
					Toluene	158.4	Trace	1.8	
					Unknown	200.4	Low	6.2	
					PCE	236.4	Low	1.3	
					Unknown	341.2	Low	19.0	
					Unknown	391.2	Low	10.8	
					Xylenes	423.4	Low	15.1	
					Unknown	499.2	Low	20.1	
					Unknown	541.1	Low	24.6	
					Unknown	635.1	Low	22.2	
					Unknown	704.3	Low	9.0	
SG104	Low	6.7	Unknown	247.9	DEC	45.7	Trace	0.605	8.05
					Unknown	145.2	Trace	0.746	
SG105	Moderate	148.0	Unknown	328.7	approx. DCE	49.0	Low	15.9	336.9
					Benzene	75.7	Low	14.5	
					TCE	96.1	Low	2.4	
					Unknown	122.1	Low	13.9	
					Toluene	157.6	Low	3.7	
					Unknown	198.3	Low	25.5	
					Unknown	235.8	Low	5.0	
					approx. PCE	252.8	Low	3.8	
					Unknown	389.2	Low	12.8	
					Xylenes	416.9	Moderate	56.9	
					Unknown	496.6	Low	11.8	
					Unknown	539.7	Low	14.1	
					Unknown	635.1	Low	8.6	
SG106	High	709.2	Xylenes	432.0	Unknown	64.3	Low	4.6	929.1
					Benzene	77.3	Low	23.6	
					TCE	96.7	Low	3.1	
					Unknown	106.9	Low	5.1	
					Unknown	122.8	Low	16.2	
					Toluene	157.6	Low	7.5	
					Unknown	199.4	Low	32.1	
					Unknown	237.0	Low	6.6	
					Unknown	254.9	Low	7.7	
					Unknown	338.7	Moderate	51.8	
					Unknown	539.7	Low	29.2	
					Unknown	641.7	Low	32.4	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG107	Low	20.6	Xylenes	420.1	approx. DCE	48.7	Low	5.4	43.1
					Benzene	74.9	Low	2.2	
					Unknown	124.8	Low	3.0	
					Unknown	145.2	Low	2.1	
					Toluene	158	Trace	1.5	
					Unknown	200.4	Low	2.2	
					Unknown	339.4	Low	6.1	
SG108	high	322.1	Unknown	505.7	Unknown	53.6	Low	18.9	715.9
					Benzene	78.1	Low	3.3	
					TCE	100.6	Low	2.3	
					Toluene	170.7	Trace	1.6	
					Unknown	204.8	Low	30.9	
					Unknown	240.9	Low	10.4	
					Unknown	343.9	Moderate	153.9	
					Xylenes	406.4	Moderate	105.7	
					Unknown	623.1	Low	45.8	
					Unknown	700.7	Low	21.0	
SG109	Low	5.0	DCE	46.7	Benzene	77.1	Trace	0.698	5.698
SG110	Low	2.6	DCE	47.3	Unknown	136.8	Trace	0.476	3.076
SG111	Trace	0.943	Benzene	78.3	Unknown	136	Trace	0.490	1.433
SG112	Low	5.3	Unknown	351.1	DCE	48.5	Trace	0.686	30.9
					Unknown	57.5	Trace	0.626	
					Unknown	68.3	Trace	0.303	
					Benzene	84.4	Trace	1.1	
					TCE	102.1	Trace	1.1	
					Unknown	132.8	Low	4.8	
					Unknown	145.2	Trace	0.903	
					Unknown	210.6	Trace	1.6	
					Unknown	398.2	Trace	2.0	
					Xylenes	427.8	Low	5.1	
					Unknown	510.9	Low	3.2	
					Unknown	543.9	Low	2.6	
					Unknown	641.7	Trace	1.6	
SG113	Trace	0.627	Unknown	732.6	DCE	47.7	Trace	0.358	0.985
SG114	Low	3.7	DCE	48.5	Benzene	79.9	Trace	1.9	6.273
					Unknown	137.6	Trace	0.358	
					Unknown	158.0	Trace	0.315	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG115	Low	29.1	Unknown	546.7	approx. DCE	49.3	Low	13.4	223
					Unknown	56.2	Low	4.7	
					Benzene	83.8	Low	2.7	
					TCE	101.5	Low	2.1	
					Unknown	130.8	Low	6.9	
					Toluene	172.7	Low	7.9	
					Unknown	210	Low	19.4	
					PCE	245.8	Low	9.9	
					Unknown	350.2	Low	31.0	
					Unknown	399.2	Low	11.3	
					Xylenes	430	Low	25.3	
					Unknown	504.4	Low	27.8	
					Unknown	643.4	Low	24.3	
					Unknown	711.5	Low	7.2	
SG116	Low	9.7	Toluene	175.2	Unknown	51.5	Low	6.1	24.6
					Unknown	71.7	Low	1.7	
					Benzene	79.3	Low	4.8	
					TCE	103.6	Trace	0.315	
					Unknown	135.2	Trace	0.493	
					Unknown	145.6	Trace	0.357	
					Unknown	352	Trace	0.413	
					Unknown	645.1	Trace	0.750	
SG117	Trace	1.8	DCE	46.1	Unknown	137.2	Trace	0.373	3.9
					Unknown	161.7	Trace	1.7	
SG118	Trace	0.657	Benzene	79.3	Unknown	136	Trace	0.418	1.08
SG119	Trace	0.551	Unknown	134.4	Benzene	78.1	Trace	0.323	1.4
					Unknown	134.4	Trace	0.551	
SG120	Low	8.2	Unknown	350.2	DCE	48.3	Low	2.9	56.3
					Benzene	78.7	Trace	0.376	
					Unknown	131.2	Trace	1.3	
					Unknown	145.2	Trace	0.420	
					Toluene	173.7	Low	7.5	
					Unknown	210	Trace	1.2	
					Unknown	350.2	Low	8.2	
					Unknown	398.2	Low	3.5	
					Xylenes	428.9	Low	5.7	
					Unknown	505.7	Low	7.6	
					Unknown	545.3	Low	4.7	
					Unknown	650.2	Low	4.7	
SG121	Moderate	141.5	Unknown	453.2	Unknown	51	Low	8.7	277
					Unknown	87.7	Low	4.2	
					Unknown	145.6	Low	2.5	
					Unknown	191.2	Low	10.3	
					Unknown	373.2	Low	8.2	

AREA A LANDFILL – SOIL GAS ANLAYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG121 continued					Xylenes	421.2	Low	16.8	
					Unknown	535.9	Moderate	82.0	
					Unknown	675.7	Low	2.8	
SG122	Low	2.9	Unknown	41.1	approx. DCE	50.7	Low	2.7	13.7
					Benzene	79.6	Trace	0.445	
					Unknown	145.2	Trace	1.2	
					Toluene	177.2	Trace	1.2	
					Unknown	352.9	Trace	1.3	
					Unknown	401.4	Trace	1.5	
					Unknown	432.2	Trace	1.7	
					Unknown	651.9	Trace	0.706	
SG123	Trace	0.855	approx. DCE	48.3	Unknown	138.8	Trace	0.355	1.85
					Unknown	145.2	Trace	0.316	
					Unknown	158.4	Trace	0.323	
SG124	Low	2.4	Unknown	50.7	Benzene	78.7	Trace	0.799	3.2
SG125	Trace	0.815	Unknown	48.1	ND	----	----	----	----
SG126	----	----	ND	----	ND	----	----	----	
SG127	Low	2.5	Unknown	49.0	Benzene	78.9	Trace	0.442	2.94
SG128	Low	2.9	Unknown	50.3	Benzene	78.5	Trace	0.657	3.55
SG129	Low	4.9	Unknown	52.1	Benzene	76.5	Trace	1.3	13.1
					Toluene	170.7	Trace	1.4	
					Unknown	341.2	low	2.8	
					Unknown	387.2	Trace	0.916	
					Xylenes	416.8	Trace	1.8	
SG130	Low	2.2	Xylenes	420.1	Unknown	48.3	Trace	1.1	7.5
					Unknown	52.3	Low	2.1	
					Unknown	70.3	Trace	0.367	
					approx. Benzene	77.3	Trace	1.4	
					Unknown	344.8	Trace	0.366	
SG131	Trace	1.3	approx. Benzene	78.1	Unknown	344.8	Trace	0.670	2.83
					Xylenes	417.9	Trace	0.863	
SG132	Trace	1.1	Unknown	345.7	ND	----	----	----	1.1
SG133	Trace	1.3	Unknown	345.7	Unknown	48.1	Trace	1.2	3.7
					Benzene	78.3	Trace	445.8	
					Unknown	421.2	Trace	0.779	
SG134	Trace	1.3	Unknown	343.9	Unknown	50.7	Trace	1.0	3.3
					Unknown	419	Trace	1.0	
SG135	Low	2.7	Xylenes	417.9	Unknown	50.9	Trace	1.8	8.03
					Benzene	77.5	Trace	0.574	
					Unknown	111.1	Trace	0.654	
					Unknown	343	Low	2.3	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG136	Trace	1.0	Unknown	342.1	Unknown	181.2	Trace	0.353	2.206
					Xylenes	416.8	Trace	0.853	
SG137	Low	6.2	Unknown	51.9	Unknown	70.1	Trace	1.4	12.5
					Benzene	77.5	Low	2.8	
					Unknown	343	Trace	1.1	
					Xylenes	416.8	Trace	1.6	
SG138	Low	2.3	Benzene	77.9	Unknown	51.9	Trace	1.3	5.75
					Unknown	344.8	Trace	0.951	
					Xylenes	419	Trace	1.2	
SG139	Low	3.3	Benzene	76.1	Unknown	51.5	Low	2.8	10.61
					Unknown	67.3	Low	2.1	
					Toluene	166.2	Trace	0.605	
					Unknown	335.8	Trace	1.8	
SG140	Trace	1.9	Unknown	52.1	Unknown	47.5	Trace	0.986	5.15
					Unknown	62.1	Trace	0.609	
					Benzene	76.3	Trace	1.2	
					Toluene	166.7	Trace	0.451	
SG141	Trace	2.0	Benzene	76.1	Toluene	166.2	Trace	1.3	4.15
					Unknown	332.2	Trace	0.845	
SG142	ND	----	----	----	ND	----	----	----	----
SG143	Trace	1.3	Benzene	74.9	Unknown	67.1	Trace	0.344	2.37
					Toluene	158.4	Trace	0.724	
SG144	ND	----	----	----	ND	----	----	----	----
SG145	ND	----	----	----	ND	----	----	----	----
SG146	Trace	2.0	Unknown	50.1	Unknown	56.7	Trace	1.2	4.74
					Unknown	72.9	Trace	0.990	
					Unknown	552.3	Trace	0.550	
SG147	----	----	ND	----	ND	----	----	----	----
SG148	----	----	ND	----	ND	----	----	----	----
SG149	----	----	ND	----	ND	----	----	----	----
SG150	----	----	ND	----	ND	----	----	----	----
SG151	Moderate	61.1	approx. Toluene	158.9	approx. DCE	46.9	Low	12.8	177.3
					Unknown	65.9	Low	4.3	
					approx. Benzene	80.3	Low	49.1	
					TCE	97.0	Low	15.2	
					Unknown	122.0	Low	2.1	
					Unknown	136.4	Low	5.6	
					Unknown	211.2	Low	5.1	
					Unknown	335.8	Trace	1.5	
					Unknown	395.2	Low	10.1	
					Unknown	470.0	Low	8.6	
					Unknown	586.3	Trace	0.896	
					Unknown	688.9	Trace	0.878	

AREA A LANDFILL – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG152	Low	5.1	Xylenes	401.4	approx. DCE	47.1	Trace	1.4	21.3
					Unknown	50.9	Low	3.5	
					Unknown	59.3	Low	2.3	
					Unknown	67.9	Low	2.3	
					Benzene	75.1	Low	4.5	
					Toluene	162.7	Trace	1.2	
					Unknown	474.8	Trace	1.0	
SG153	Low	3.6	Xylenes	406.9	Benzene	75.7	Trace	0.651	6.38
					Toluene	165.2	Trace	0.724	
					Unknown	486.2	Trace	1.4	
SG154	Trace	1.9	Benzene	70.7	ND	----	----	----	1.9
SG155	Low	2.4	Benzene	70.3	ND	----	----	----	2.4
SG156	Moderate	100	Unknown	>600	approx. DCE	40.6	Low	5.5	110.3
					Unknown	49.5	Low	4.1	
					~ TCE	91.3	Trace	0.309	
					Unknown	305.1	Trace	0.398	
SG157	Trace	1.0	Unknown	689	Benzene	70.3	Trace	0.879	2.41
					unknown	307.5	Trace	0.532	
SG158	Low	2.3	Benzene	71.3	ND	----	----	----	2.3
SG159	Trace	1.9	Unknown	48.3	Benzene	70.9	Trace	1.4	3.98
					Unknown	307.5	Trace	0.679	
SG160	Low	12.8	TCE	92.3	DCE	41.6	Low	10.1	34.05
					Unknown	50	Low	7.7	
					Benzene	71.5	Trace	0.987	
					PCE	226.2	Trace	1.3	
					Unknown	379.2	Trace	0.629	
					Unknown	691.7	Trace	0.535	

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values: ND=<0.3 Vs.; Trace=0.3-2.0 Vs.; Low=2.1-50 Vs.; Moderate=50.1-300 Vs.; and High=>300 Vs.

DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)

DRMO – SOIL GAS ANALYSIS RESULTS									
SAMPLE ID	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	Low	2.5	Benzene	78.3	Unknown	70.5	Trace	0.871	6.252
					Toluene	172.7	Trace	0.781	
					PCE	252.8	Low	2.1	
SG2	Moderate	70.2	TCE	104.1	DCE	45.1	Low	2.5	87.6
					Unknown	54.5	Low	11.4	
					PCE	254.2	Low	3.5	
SG3	Low	4.9	TCE	101.8	Unknown	54.5	Low	2.1	9.933
					Benzene	78.1	Trace	1.7	
					Toluene	172.7	Trace	0.475	
					PCE	252.8	Trace	0.758	
SG4	Trace	2.0	Benzene	78.1	Toluene	170.7	Trace	1.7	3.7
SG5	ND	----	----	----	ND	----	----	----	----
SG6	Trace	0.332	Toluene	138.8	ND	----	----	----	0.332
SG7	ND	----	----	----	ND	----	----	----	----
SG8	Trace	1.1	TCE	87.1	Unknown	33.3	Trace	0.663	3.403
					Benzene	66.8	Trace	0.816	
					PCE	218.0	Trace	0.823	
SG9	Trace	0.838	TCE	87.1	Benzene	66.6	Trace	0.332	1.17
SG10	Low	2.7	DCE	45.9	Benzene	66.1	Trace	0.617	6.476
					TCE	86.2	Trace	0.935	
					Unknown	488.8	Trace	1.4	
					Unknown	578.8	Trace	0.822	
SG11	ND	----	----	----	ND	----	----	----	----
SG12	Trace	0.641	Benzene	66.3	Toluene	146.8	Trace	0.418	1.059
SG13	Low	6.1	TCE	86.2	Benzene	65.9	Trace	0.331	6.431
SG14	Low	24.5	PCE	220.8	Unknown (Probably has DCE masked in peak)	50.9	Low	22.0	63.1
					TCE	86.4	Low	16.6	----
SG15	Trace	0.385	Benzene	66.7	ND	----	----	----	0.385
SG16	ND	----	----	----	ND	----	----	----	----
SG17	ND	----	----	----	ND	----	----	----	----
SG18	Trace	0.313	Benzene	67.1	ND	----	----	----	0.313
SG19	ND	----	----	----	ND	----	----	----	----
SG20	Trace	1.8	TCE	88.0	ND	----	----	----	1.8
SG21	Low	16.6	TCE	86.5	Benzene	66.7	Trace	2.0	19.6
					PCE	220.8	Trace	1.0	
SG22	Low	29.2	TCE	87.6	DCE	38.0	Low	3.6	48.5
					Unknown	48.7	Low	14.6	
					PCE	220.8	Trace	1.1	

DRMO – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG23	High	533.5	Unknown (Benzene probably masked in peak)	53.3	Unknown	110.2	Low	8.8	755.68
					Toluene	133.6	Low	22.0	
					Unknown	154.8	Low	3.8	
					Unknown	167.2	Low	10.3	
					Unknown	208.4	Low	13.4	
					Unknown	261.8	Trace	0.782	
					Unknown	310.7	Low	48.2	
					Unknown	488.8	Low	41.4	
					Unknown	581.8	Low	37.0	
					Unknown	709.7	Low	23.2	
					Unknown	798.6	Low	13.3	
SG24	Low	2.3	TCE	85.6	Benzene	60.9	Trace	0.580	3.260
					Toluene	131.2	Trace	0.380	
SG25	Low	2.9	TCE	80.5	ND	----	----	----	2.9
SG26	Low	2.4	TCE	83.5	ND	----	----	----	2.4
SG27	Trace	1.6	Unknown	905.7	TCE	80.8	Trace	1.0	3.0
					Toluene	133.6	Trace	0.435	
SG28	Moderate	83.5	TCE	87.0	Benzene	65.7	Trace	2.0	85.907
					Toluene	133.6	Trace	0.407	
SG29	Low	3.8	TCE	81.1	ND	----	----	----	3.8
SG30	ND	----	----	----	ND	----	----	----	----
SG31	ND	----	----	----	ND	----	----	----	----
SG32	Low	2.4	Benzene	64.3	Toluene	136.4	Trace	0.863	5.199
					Unknown	650.2	Trace	1.0	
					Unknown	709.7	Trace	0.936	
SG33	Trace	1.7	Unknown	648.5	Benzene	63.9	Trace	1.2	5.493
					Toluene	135.2	Trace	0.483	
					Unknown	482.3	Trace	0.386	
					Unknown	532.7	Trace	0.323	
					Unknown	708.7	Trace	1.4	
SG34	Low	3.1	Benzene	63.5	Toluene	135.8	Trace	0.830	7.820
					PCE	205.2	Trace	0.666	
					Unknown	482.3	Trace	0.723	
					Unknown	646.8	Trace	1.2	
					Unknown	713.3	Trace	1.3	
SG35	ND	----	----	----	ND	----	----	----	----
SG36	ND	----	----	----	ND	----	----	----	----
SG37	Trace	0.664	Toluene	136.8	Unknown	57.9	Trace	0.364	1.511
					TCE	83.5	Trace	0.482	----
SG38	Trace	1.2	TCE	83.2	ND	----	----	----	1.2
SG39	ND	----	----	----	ND	----	----	----	----

DRMO – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE ID	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG40	ND	----	----	----	ND	----	----	----	----
SG41	ND	----	----	----	ND	----	----	----	----
SG42	ND	----	----	----	ND	----	----	----	----
SG43	ND	----	----	----	ND	----	----	----	----
SG44	ND	----	----	----	ND	----	----	----	----
SG45	ND	----	----	----	ND	----	----	----	----
SG46	ND	----	----	----	ND	----	----	----	----
SG47	ND	----	----	----	ND	----	----	----	----
SG48	ND	----	----	----	ND	----	----	----	----
SG49	ND	----	----	----	ND	----	----	----	----
SG50	ND	----	----	----	ND	----	----	----	----
SG51	ND	----	----	----	ND	----	----	----	----
SG52	ND	----	----	----	ND	----	----	----	----
SG53	ND	----	----	----	ND	----	----	----	----

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values: ND=<0.3 Vs.; Trace=0.3-2.0 Vs.; Low=2.1-50 Vs.; Moderate=50.1 Vs.-300 Vs.; High=> 300 Vs.
4. Samples SG41 through SG51 appear to have been taken with a partially blocked syringe (possible false negatives).

LOWER SUBASE

LOWER BASE – SOIL GAS ANALYSIS RESULTS									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG1	ND	----	----	----	ND	----	----	----	0.358
SG2	Trace	0.358	Benzene	63.7	ND	----	----	----	----
SG3	ND	----	----	----	ND	----	----	----	563.2
SG4	High	427	Unknown (Benzene most likely masked in peak)	85.9	Unknown	48.9	Moderate	71.1	
					Unknown	118.7	Low	12.0	
					Toluene	137.7	Low	28.7	
					Unknown	152.7	Low	11.1	
					Unknown	167.7	Low	9.5	
					Unknown	219.0	Low	3.8	
SG5	Low	2.1	Unknown	53.1	Benzene	65.1	Trace	1.7	3.8
SG6	ND	----	----	----	ND	----	----	----	----
SG7	Trace	1.9	Benzene	66.3	ND	----	----	----	1.9
SG8	ND	----	----	----	ND	----	----	----	----
SG9	Low	3.3	Toluene	140.0	Unknown	70.9	Trace	0.335	6.36
					Unknown	302.7	Trace	0.935	
					Xylenes	375.2	Trace	0.457	
					Xylenes	450.8	Trace	0.715	
					Unknown	487.5	Trace	0.621	
SG10	ND	----	----	----	ND	----	----	----	----
SG11	Low	4.0	Unknown	298.7	Unknown	84.1	Trace	1.6	9.57
					Toluene	138.8	Trace	0.746	
					Unknown	218.4	Trace	0.710	
					Ethyl Benzene	345.7	Trace	1.3	
					Xylenes	441.2	Trace	0.813	
					Unknown	481.0	Trace	0.396	
SG12	ND	----	----	----	ND	----	----	----	----
SG13	ND	----	----	----	ND	----	----	----	----
SG14	ND	----	----	----	ND	----	----	----	----
SG15	ND	----	----	----	ND	----	----	----	----
SG16	Moderate	63.5	Unknown	25.0	Unknown	42.5	Low	15.1	206.6
					Benzene	54.6	Low	6.1	
					Unknown	75.1	Low	42.5	
					Unknown	105.5	Low	30.3	
					Toluene	129.9	Low	8.1	
					Unknown	143.2	Low	3.4	
					Unknown	156.0	Low	12.6	
					Unknown	195.2	Low	2.6	
					Unknown	209.4	Trace	2.0	
					Unknown	291.5	Low	10.4	
					Ethyl Benzene	334.9	Low	3.8	
					Unknown	430.0	Trace	0.408	
					Xylenes	468.8	Trace	0.474	
					Unknown	552.3	Trace	0.953	
					Unknown	700.7	Low	2.3	
					Unknown	778.6	Low	2.1	

LOWER BASE – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG17	ND	----	----	----	ND	----	----	----	----
SG18	Low	13.4	Unknown	288.3	ND	----	----	----	13.4
SG19	ND	----	----	----	ND	----	----	----	----
SG20	Low	5.2	Unknown	28.0	Unknown	44.3	Trace	0.567	7.51
					Benzene	64.1	Trace	1.2	
					Toluene	136.4	Trace	0.543	
SG21	Trace	0.504	Benzene	63.7	ND	----	----	----	0.504
SG22	ND	----	----	----	ND	----	----	----	----
SG23	Trace	0.343	Benzene	64.7	ND	----	----	----	0.343
SG24	Trace	0.668	Benzene	64.9	Toluene	138.4	Trace	0.651	1.32
SG25	ND	----	----	----	ND	----	----	----	----
SG26	Moderate	50	Unknown	821.7	Unknown	45.1	Trace	0.357	162.8
					Benzene	65.3	Trace	1.6	
					Unknown	107.5	Trace	1.7	
					Unknown	167.7	Trace	1.4	
					Unknown	199.8	Trace	0.922	
					Unknown	214.8	Trace	0.508	
					Unknown	295.5	Low	19.8	
					Ethyl Benzene	337.6	Low	7.6	
					Xylenes	375.2	Low	4.4	
					Xylenes	431.1	Low	15.9	
					Unknown	471.2	Low	15.8	
					Unknown	559.3	Low	24.7	
					Unknown	682.7	Low	18.1	
SG27	Low	2.3	Unknown	524.3	Unknown	100.0	Trace	2.0	4.3
SG28	Low	3.2	Benzene	65.3	Unknown	293.9	Low	2.3	5.5
SG29	Trace	1.1	Unknown	297.1	ND	----	----	----	1.1
SG30	Low	9.6	Unknown	568.3	Benzene	65.3	Trace	1.7	38.9
					Unknown	107.5	Trace	0.423	
					Toluene	140.0	Trace	0.856	
					Unknown	218.4	Trace	0.546	
					Unknown	293.9	Low	3.3	
					Ethyl Benzene	340.3	Trace	1.3	
					Xylenes	366.2	Low	3.7	
					Xylenes	440.0	Low	5.7	
					Unknown	473.6	Low	5.1	
					Unknown	689.9	Low	6.7	
SG31	ND	----	----	----	ND	----	----	----	----
SG32	ND	----	----	----	ND	----	----	----	----
SG33	Low	7.0	Unknown	538.3	Toluene	130.8	Trace	0.837	30.6
					Unknown	276.6	Low	4.7	
					Ethyl Benzene	321.4	Low	5.4	
					Xylenes	409.1	Low	6.8	
					Unknown	443.6	Low	5.9	

LOWER BASE – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG34	ND	----	----	----	ND	----	----	----	----
SG35	ND	----	----	----	ND	----	----	----	----
SG36	ND	----	----	----	ND	----	----	----	----
SG37	ND	----	----	----	ND	----	----	----	----
SG38	ND	----	----	----	ND	----	----	----	----
SG39	Trace	1.1	Toluene	140.4	ND	----	----	----	1.1
SG40	ND	----	----	----	ND	----	----	----	----
SG41	ND	----	----	----	ND	----	----	----	----
SG42	ND	----	----	----	ND	----	----	----	----
SG43	ND	----	----	----	ND	----	----	----	----
SG44	ND	----	----	----	ND	----	----	----	----
SG45	ND	----	----	----	ND	----	----	----	----
SG46	ND	----	----	----	ND	----	----	----	----
SG47	ND	----	----	----	ND	----	----	----	----
SG48	ND	----	----	----	ND	----	----	----	----
SG49	Low	3.2	TCE	84.7	ND	----	----	----	3.2
SG50	Low	9.0	TCE	83.3	ND	----	----	----	9.0
SG51	ND	----	----	----	ND	----	----	----	----
SG52	ND	----	----	----	ND	----	----	----	----
SG53	Trace	1.1	TCE	77.7	ND	----	----	----	1.1
SG54	ND	----	----	----	ND	----	----	----	----
SG55	ND	----	----	----	ND	----	----	----	----
SG56	ND	----	----	----	ND	----	----	----	----
SG57	Trace	0.785	TCE	77.7	ND	----	----	----	0.785
SG58	ND	----	----	----	ND	----	----	----	----
SG59	ND	----	----	----	ND	----	----	----	----
SG60	Trace	0.954	Benzene	60.7	ND	----	----	----	0.954
SG61	ND	----	----	----	ND	----	----	----	----
SG62	ND	----	----	----	ND	----	----	----	----
SG63	ND	----	----	----	ND	----	----	----	----
SG64	ND	----	----	----	ND	----	----	----	----
SG65	ND	----	----	----	ND	----	----	----	----
SG66	ND	----	----	----	ND	----	----	----	----
SG67	ND	----	----	----	ND	----	----	----	----
SG68	ND	----	----	----	ND	----	----	----	----
SG69	ND	----	----	----	ND	----	----	----	----
SG70	Trace	1.3	Unknown	43.1	ND	----	----	----	1.3
SG71	Trace	0.410	Toluene	135.6	Unknown	29.8	Trace	0.379	0.789
SG72	Trace	1.6	Unknown	40.1	ND	----	----	----	1.6
SG73	Trace	1.8	Unknown	43.1	Benzene Toluene	62.9 135.6	Trace Trace	0.815 0.469	3.08
SG74	ND	----	----	----	ND	----	----	----	----

LOWER BASE – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG75	Low	4.7	Unknown	722.5	Benzene	62.7	Trace	0.730	8.4
					Toluene	134.0	Low	2.1	
					Unknown	292.3	Trace	0.432	
					Xylenes	441.2	Trace	0.433	
SG76	ND	----	----	----	ND	----	----	----	----
SG77	Low	2.6	Unknown	47.5	Benzene	61.3	Trace	1.5	4.441
					Toluene	131.6	Trace	0.341	
SG78	ND	----	----	----	ND	----	----	----	----
SG79	ND	----	----	----	ND	----	----	----	----
SG80	ND	----	----	----	ND	----	----	----	----
SG81	Low	7.0	TCE	80.5	ND	----	----	----	7
SG82	Low	7.1	TCE	81.4	Benzene	62.7	Trace	0.505	7.605
SG83	Low	10.3	TCE	80.6	Unknown	44.1	Trace	0.365	16.1
					Toluene	134.8	Low	3.6	
					Unknown	206.4	Trace	0.321	
					Unknown	283.5	Trace	1.0	
					Ethylbenzene	333.1	Trace	0.503	
SG84	Low	31.5	TCE	82.7	ND	----	----	----	31.5
SG85	Low	7.1	TCE	82.9	ND	----	----	----	7.1
SG86	Low	3.2	TCE	82.6	ND	----	----	----	3.2
SG87	High	921.0	Unknown (Benzene probably masked in peak)	52.0	Toluene	135.3	Low	9.8	932.1
					Xylenes	364.2	Trace	1.3	
SG88	Low	3.2	TCE	82.3	Benzene	63.1	Trace	0.421	3.621
SG89	Trace	1.9	TCE	82.6	Benzene	63.5	Trace	0.624	2.524
SG90	Low	3.8	TCE	82.9	ND	----	----	----	3.8
SG91	Trace	1.8	TCE	83.8	ND	----	----	----	1.8
SG92	Low	2.9	TCE	82.8	Benzene	63.3	Trace	1.9	5.6
					Toluene	135.6	Trace	0.766	
SG93	ND	----	----	----	ND	----	----	----	----
SG94	ND	----	----	----	ND	----	----	----	----
SG95	ND	----	----	----	ND	----	----	----	----
SG96	Low	2.2	Toluene	138.8	Unknown	43.3	Trace	0.616	6.74
					Unknown	47.5	Trace	1.3	
					Benzene	58.1	Trace	0.624	
					Unknown	75.9	Trace	2.0	
SG97	ND	----	----	----	ND	----	----	----	----
SG98	ND	----	----	----	ND	----	----	----	----
SG99	ND	----	----	----	ND	----	----	----	----

LOWER BASE – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG100	Moderate	124.1	Unknown	120.0	Unknown	20.9	Low	20.4	416.6
					Unknown	28.3	Low	2.8	
					Unknown	33.4	Low	2.3	
					Unknown	41.5	Low	13.0	
					Unknown	56.2	Low	8.8	
					Unknown	79.0	Moderate	90.0	
					Toluene	146.2	Low	8.0	
					Unknown	169.3	Low	30.3	
					Unknown	198.7	Low	28.7	
					Unknown	303.2	Moderate	85.4	
					Unknown	491.4	Low	2.1	
					Unknown	577.3	Trace	0.700	
SG101	ND	----	----	----	ND	----	----	----	----
SG102	ND	----	----	----	ND	----	----	----	----
SG103	ND	----	----	----	ND	----	----	----	----
SG104	ND	----	----	----	ND	----	----	----	----
SG105	ND	----	----	----	ND	----	----	----	----
SG106	ND	----	----	----	ND	----	----	----	----
SG107	Low	7.6	Xylenes	456.8	Benzene	62.5	Trace	1.4	22.3
					TCE	81.1	Trace	0.444	
					Toluene	133.6	Low	3.4	
					Unknown	297.6	Low	2.2	
					Xylenes	376.2	Low	7.3	
SG108	ND	----	----	----	ND	----	----	----	----
SG109	Low	12.2	Xylenes	377.2	Benzene	62.5	Low	3.4	38.0
					Toluene	134.0	Low	5.9	
					Unknown	297.9	Trace	0.676	
					Xylenes	458.0	Low	12.2	
					Unknown	718.7	Trace	0.435	
					Unknown	889.6	Low	3.2	
SG110	Trace	0.681	Benzene	62.3	Toluene	134.0	Trace	0.466	1.147
SG111	ND	----	----	----	ND	----	----	----	----
SG112	Trace	0.270	TCE	86.2	ND	----	----	----	0.270
SG113	Low	3.6	Unknown	309.9	Benzene	66.3	Trace	0.779	9.8
					TCE	86.5	Trace	1.0	
					Unknown	488.8	Trace	2.0	
					Unknown	584.8	Trace	0.483	
					Unknown	730.1	Trace	0.305	
					Unknown	880.4	Trace	1.6	
SG114	Low	2.3	Toluene	142.0	Unknown	77.9	Trace	1.5	5.7
					Unknown	96.1	Trace	1.9	
SG115	Trace	1.1	TCE	86.2	Benzene	66.3	Trace	0.481	1.581

LOWER BASE – SOIL GAS ANALYSIS RESULTS (continued)									
SAMPLE I.D.	SAMPLE CONCENTRATION	Vs.	INDICATOR PEAK	R.T. (Sec.)	ADDITIONAL CONSTITUENTS	R.T. (Sec.)	CONCENTRATION	Vs.	TOTAL Vs.
SG116	ND	----	----	----	ND	----	----	----	----
SG117	ND	----	----	----	ND	----	----	----	----
SG118	Trace	0.371	Benzene	66.6	ND	----	----	----	0.371
SG119	ND	----	----	----	ND	----	----	----	----
SG120	ND	----	----	----	ND	----	----	----	----
SG121	Trace	0.891	TCE	74.3	ND	----	----	----	0.891
SG122	ND	----	----	----	ND	----	----	----	----
SG123	Trace	0.579	Benzene	58.5	Toluene	125.6	Trace	0.464	1.0
SG124	ND	----	----	----	ND	----	----	----	----
SG125	ND	----	----	----	ND	----	----	----	----
SG126	ND	----	----	----	ND	----	----	----	----
SG127	ND	----	----	----	ND	----	----	----	----

NOTES:

1. Vs. is volt/seconds, which is an integrated area count of chromatographic peaks representing relative quantitation.
2. R.T. is retention time for specific compound in seconds.
3. Samples were classified by concentration using the following values: ND=<0.3 Vs.; Trace=0.3-2.0 Vs.; Low=2.1-50 Vs.; Moderate=50.1-300 Vs.; High = > 300 Vs.

APPENDIX B

TEST BORING LOGS AND MONITORING WELL CONSTRUCTION DETAILS

HYDRAULIC CONDUCTIVITY DATA

TEST BORING LOGS AND MONITORING WELL CONSTRUCTION DETAILS

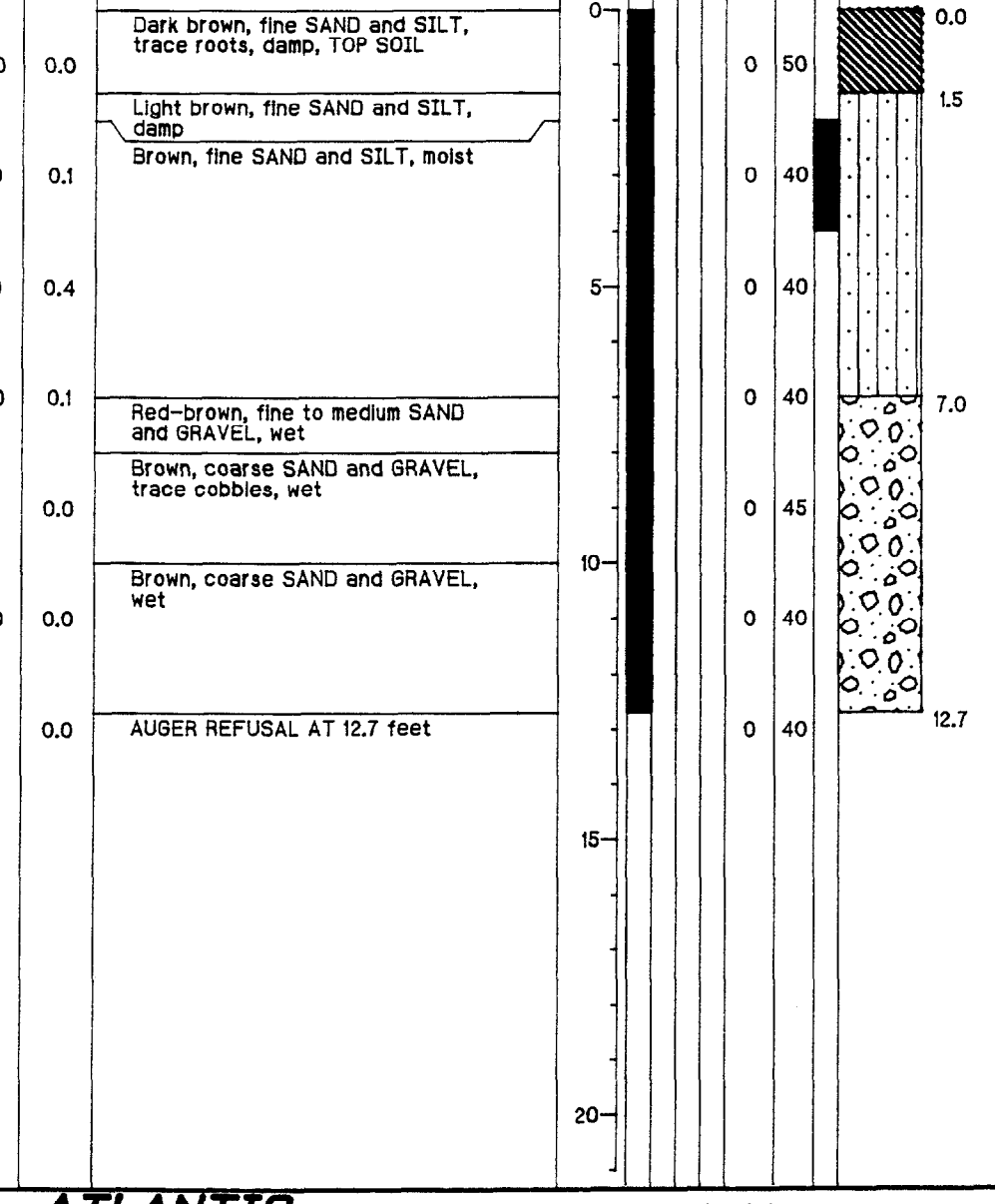
TORPEDO SHOP

BORING LOG 7 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/09/90
DATA COMPLETED: 08/09/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 48.6
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, PARTLY CLOUDY, HUMID
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	3 4 4 3	100	0.0	Dark brown, fine SAND and SILT, trace roots, damp, TOP SOIL
				Light brown, fine SAND and SILT, damp
2-4	4 5 5 6	80	0.1	Brown, fine SAND and SILT, moist
4-6	6 7 7 8	90	0.4	
6-8	17 33 55 55	100	0.1	Red-brown, fine to medium SAND and GRAVEL, wet
8-10	45 60 100/6	60	0.0	Brown, coarse SAND and GRAVEL, trace cobbles, wet
10-12	32 66 80 90	100	0.0	Brown, coarse SAND and GRAVEL, wet
12-14	85 100/2	35	0.0	AUGER REFUSAL AT 12.7 feet



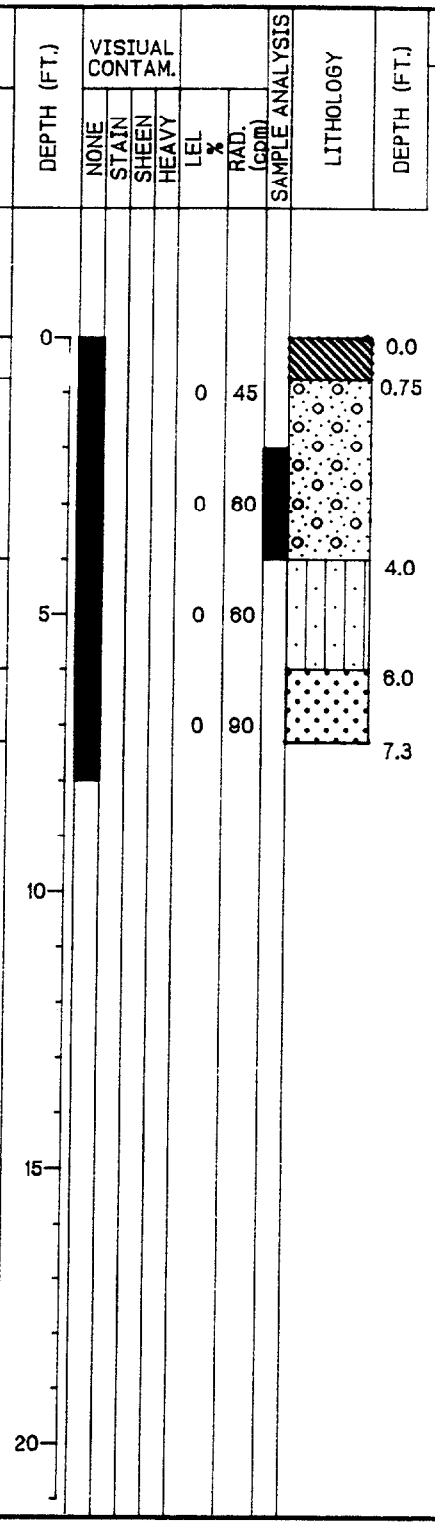
ATLANTIC

BORING LOG 7 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/09/90
DATA COMPLETED: 08/09/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 48.8
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 78°, PARTLY CLOUDY, HUMID
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	2 4 5 5	85	0.2	Dark brown, fine SAND and SILT, trace roots, damp, TOP SOIL Brown, fine to medium SAND, some silt, trace gravel, damp
2-4	17 38 31 19	40	0.2	
4-6	34 17 19 27	60	0.0	Olive green, fine SAND and SILT, trace gravel, moist
6-8	54 59 100/3	60	NA	Olive green, medium SAND some gravel, grading to red color, wet AUGER REFUSAL AT 7.3 feet



ATLANTIC

BORING LOG 7 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/08/90
DATA COMPLETED: 08/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 44.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, CLOUDY, RAIN SHOWERS
INSPECTOR: MICHAEL NEJDL AND NICOLE RUDERMAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	4 9 19 28	50	0.0	Dark brown, fine SAND and SILT, trace roots, damp, TOP SOIL Brown, fine SAND, trace gravel, damp						NA	40			0.2	
2-4	29 30 70 100/3	50	0.0	Brown, fine to medium SAND, trace gravel, damp						NA	50			2.0	
4-6	3 6 7 8	35	0.0	Brown, fine to medium SAND and GRAVEL, some silt, damp	5					0	35			4.0	
6-8	8 13 11 15	65	0.0	Brown, fine to coarse SAND and GRAVEL, some silt, damp						0	40				
8-10	2 4 DRILL	15	0.0	Brown, coarse SAND and GRAVEL, mottled, damp, DRILL WITH AIR ROTARY THROUGH BOULDER FROM 9.0 TO 10.0						0	50				
10-12	1 2 2 1	90	0.0	Brown, SILT and CLAY, some fine sand, moist	10					0	40			10.0	
12-14	5 7 9 7	90	0.0	Grey, fine SAND, some clay orange mottling, wet						0	40			12.0	
14-16	7 10 7 8	100	0.0		15					0	40				
16-18	5 7 7 13	100	0.0							0	40				
18-20	9 11 12 14	100	0.0	Brown, fine SAND and SILT, wet						0	40			18.0	
				END OF BORING AT 20.0 feet	20									20.0	

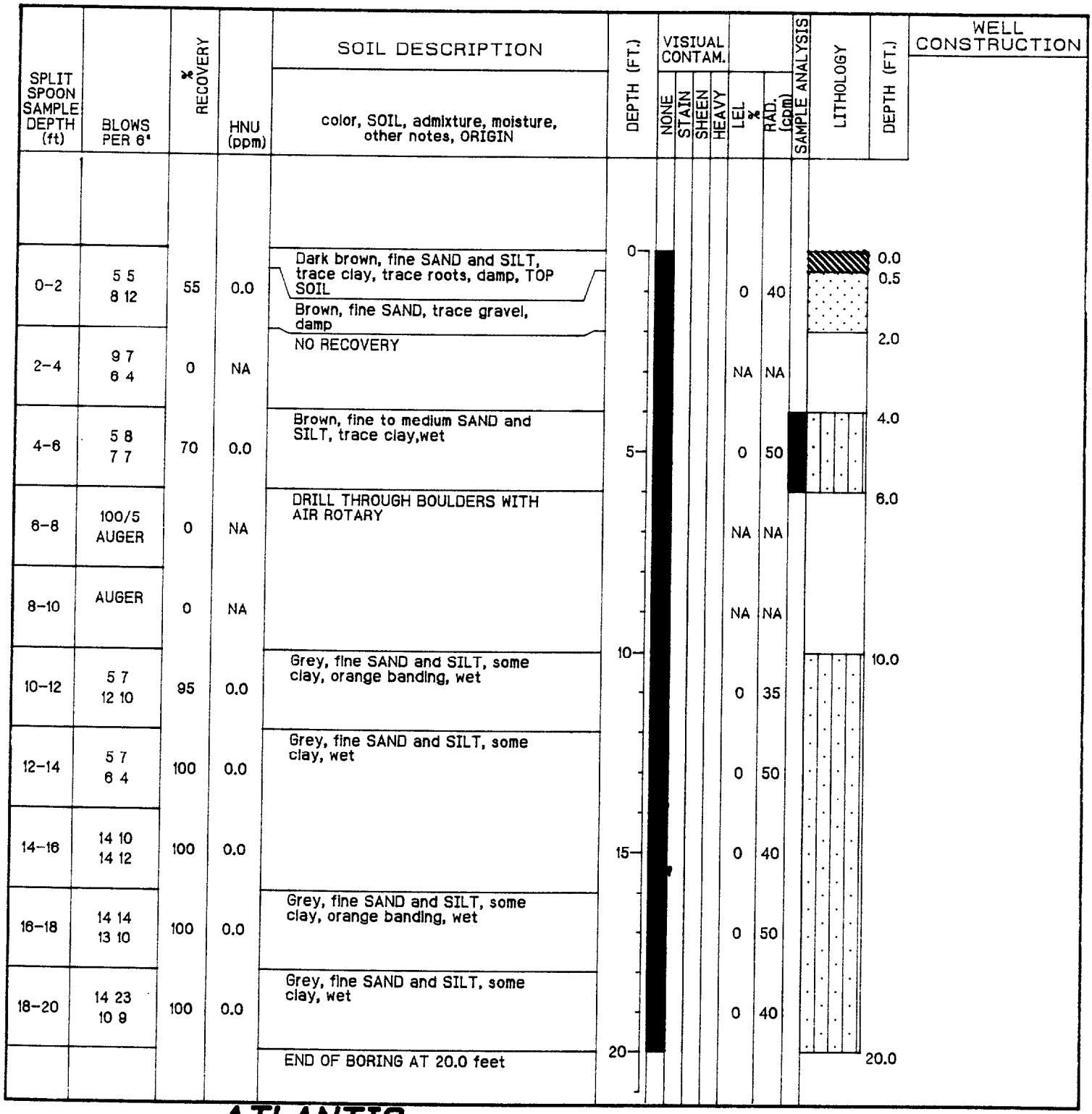
ATLANTIC

BORING LOG 7 TB 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/14/90
DATA COMPLETED: 08/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 46.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, LIGHT CLOUD COVER, WINDY
INSPECTOR: MICHAEL NEJDL AND NICOLE RUDERMAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 5 8 12	55	0.0	Dark brown, fine SAND and SILT, trace clay, trace roots, damp, TOP SOIL Brown, fine SAND, trace gravel, damp
2-4	9 7 6 4	0	NA	NO RECOVERY
4-6	5 8 7 7	70	0.0	Brown, fine to medium SAND and SILT, trace clay,wet
6-8	100/5 AUGER	0	NA	DRILL THROUGH BOULDERS WITH AIR ROTARY
8-10	AUGER	0	NA	
10-12	5 7 12 10	95	0.0	Grey, fine SAND and SILT, some clay, orange banding, wet
12-14	5 7 6 4	100	0.0	Grey, fine SAND and SILT, some clay, wet
14-16	14 10 14 12	100	0.0	
16-18	14 14 13 10	100	0.0	Grey, fine SAND and SILT, some clay, orange banding, wet
18-20	14 23 10 9	100	0.0	Grey, fine SAND and SILT, some clay, wet
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 7 TB 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/10/90
DATA COMPLETED: 08/10/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 44.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 78°, CLOUDY
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	2 4 5 7	90	0.0	Dark brown, fine SAND and SILT, trace roots, damp, TOP SOIL Brown, SAND and SILT, trace gravel, damp						0	40			0.65	
2-4	9 6 5 4	20	0.0							0	40				
4-6	1 1 1 1	40	0.0	Brown, SAND and SILT, some gravel, moist	5					0	40				
6-8	4 2 2 2	85	0.0	Brown, SILT, trace gravel, wet at 6.5 feet						1	30			6.0	
8-10	3 4 4 4	100	NA	Grey-brown, fine SAND and SILT, wet						NA	40			8.0	
10-12	4 3 3 5	60	0.0		10					0	45				
12-14	4 6 6 5	100	0.0							0	42.5				
14-16	4 7 7 6	100	0.0	Red-brown, fine SAND and SILT, wet	15					0	30				
16-18	7 5 5 9	60	0.0	Grey-brown, fine SAND and SILT, wet						NA	30				
18-20	6 7 10 10	90	0.0	Grey-brown, SILT and CLAY, mottled, wet						NA	40			18.0	
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

BORING LOG 7 TB 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/13/90
DATA COMPLETED: 08/13/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 46.4
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, OVERCAST, HUMID
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	4 6 6 6	55	0.0	Brown, fine to medium SAND and GRAVEL, damp,
2-4	7 15 100/5	55	0.0	Brown, fine SAND and GRAVEL, moist
4-6	5 6 8 10	40	0.0	
6-8	2 2 1 1	90	0.0	Red-brown, fine SAND and SILT, trace roots, wet
8-10	2 2 6 8	95	0.0	Brown, fine SAND and SILT, some clay, wet
10-12	5 7 7 5	95	0.0	Brown, fine SAND and SILT, wet
12-14	3 4 5 4	75	0.0	Red-brown, SILT, grading to grey, SILT and CLAY, wet
14-16	5 7 9 10	100	0.0	Grey-brown, fine SAND and SILT, some clay, wet
16-18	9 10 9 11	100	0.0	Brown, fine SAND and SILT, some clay, wet
18-20	8 9 11 10	100	0.0	Grey, fine SAND, grading to brown, fine SAND and SILT, wet
				END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					0	50	
					0	50	
5					0	57.5	
					0	40	
					0	50.5	
10					0	70	
					0	60	
15					0	50	
					0	30	
					0	40	
20							

LITHOLOGY

WELL CONSTRUCTION

DEPTH (FT.): 0.0, 6.0, 12.0, 14.0, 20.0

ATLANTIC

BORING LOG 7 MW 2S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/09/90
DATA COMPLETED: 08/09/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

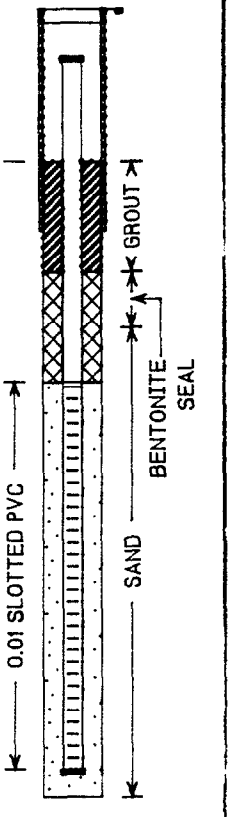
GROUND ELEVATION: 48.6
PROTECTIVE CASING ELEVATION: 51.35
WELL ELEVATION: 50.41
WATER LEVEL: 44.98 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, PARTLY CLOUDY
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
					0							
0-2	3 8 5 4	85	NA	Dark brown, fine SAND and SILT, trace roots, moist, TOP SOIL Brown, medium SAND and GRAVEL, trace silt, moist						0	NA	
2-4	3 18 21 10	30	NA	Brown, fine SAND and SILT, trace gravel, moist						0	NA	
4-6	3 4 6 6	20	NA		5					NA	NA	
6-8	18 15 5 6	50	0.0	Green-brown, fine SAND and SILT, banded with black, fine SAND and SILT, wet						0	30	
8-10	3 12 21 22	75	0.0	Green-brown, fine SAND and SILT, wet						0	57.5	
10-12	5 24 100/6	50	0.0	Green-brown, fine SAND and SILT, trace gravel, wet	10					0	30	
				AUGER REFUSAL AT 11.5 feet	15							
					20							

LITHOLOGY

DEPTH (FT.): 0.0, 0.65, 2.0, 11.5

WELL CONSTRUCTION



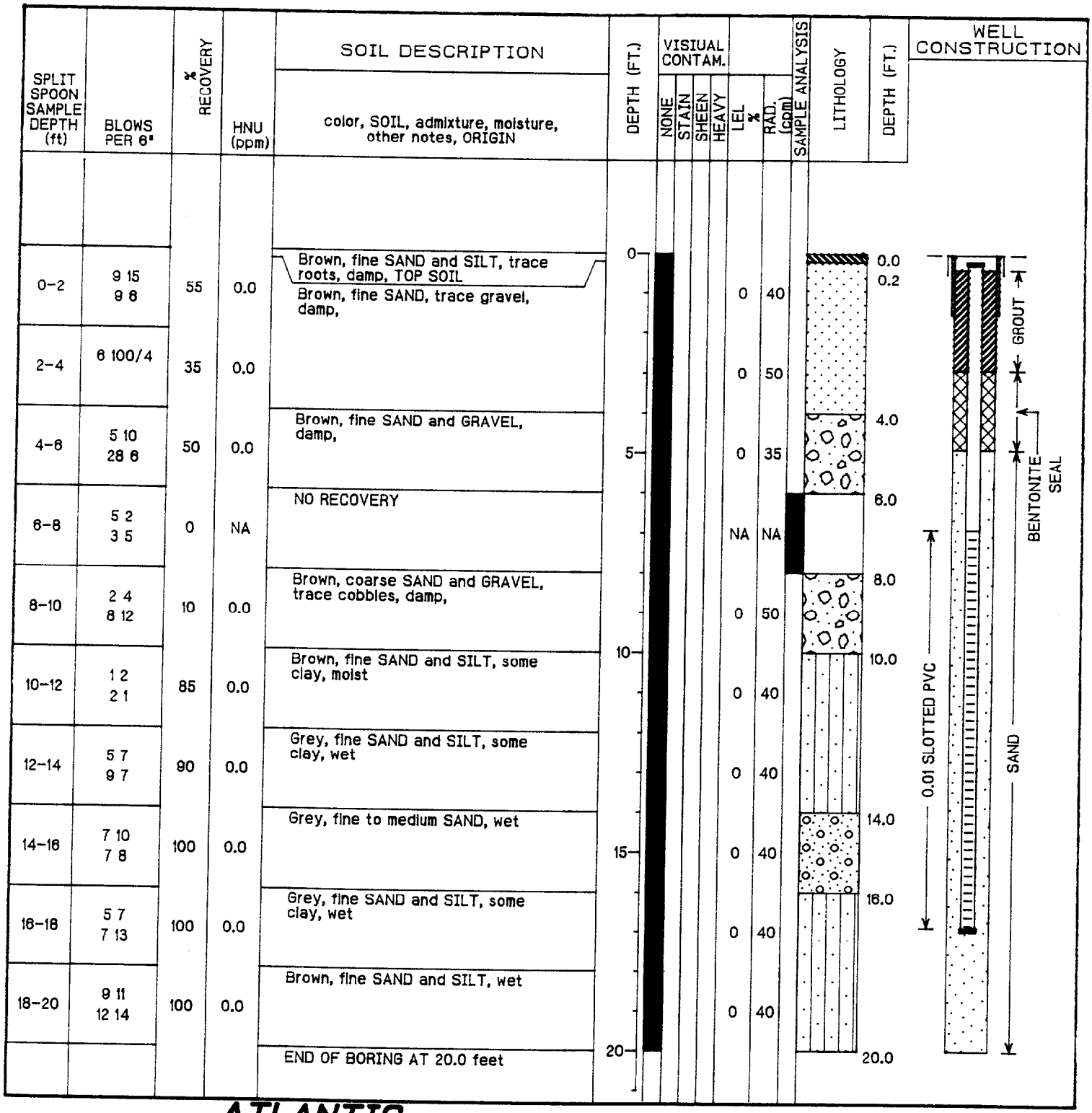
ATLANTIC

BORING LOG 7 MW 3S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: TORPEDO SHOPS
DATE STARTED: 08/08/90
DATA COMPLETED: 08/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 45.98
PROTECTIVE CASING ELEVATION: 45.98
WELL ELEVATION: 45.71
WATER LEVEL: 39.51 (03/21/91)
DATUM: SUBASE
WEATHER: 85°, CLOUDY, HUMID
INSPECTOR: MICHAEL NEJDL AND NICOLE RUDERMAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	9 15 9 6	55	0.0	Brown, fine SAND and SILT, trace roots, damp, TOP SOIL Brown, fine SAND, trace gravel, damp,
2-4	6 100/4	35	0.0	
4-6	5 10 28 6	50	0.0	Brown, fine SAND and GRAVEL, damp,
6-8	5 2 3 5	0	NA	NO RECOVERY
8-10	2 4 8 12	10	0.0	Brown, coarse SAND and GRAVEL, trace cobbles, damp,
10-12	1 2 2 1	85	0.0	Brown, fine SAND and SILT, some clay, moist
12-14	5 7 9 7	90	0.0	Grey, fine SAND and SILT, some clay, wet
14-16	7 10 7 8	100	0.0	Grey, fine to medium SAND, wet
16-18	5 7 7 13	100	0.0	Grey, fine SAND and SILT, some clay, wet
18-20	9 11 12 14	100	0.0	Brown, fine SAND and SILT, wet
				END OF BORING AT 20.0 feet



ATLANTIC

GOSS COVE LANDFILL

BORING LOG 8 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: GOSS COVE
DATE STARTED: 10/30/90
DATA COMPLETED: 10/30/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 11.4
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, SUNNY, CLEAR SKIES
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
0-2	0 31 51 72	75	4.8	Brown, fine SAND, some gravel, trace wood chips, trace glass, trace brick fragments, moist, FILL	0					1	40			0.0	
2-4	100 100/4	25	4.0	Light brown, fine to medium SAND and GRAVEL, trace cinders, iron staining, moist, FILL						1	40				
4-6	32 18 18 17	75	14.0	Black, fine SAND, grading to, orange-brown, fine to coarse SAND, trace roots, metal fillings, cinders, iron staining, moist, FILL	5					1	70				
6-8	19 21 23 17	50	7.0	Grey, medium SAND and GRAVEL, moist						1	50			6.0	
				Brown, fine to coarse SAND, trace silt, trace clay, iron staining, moist										7.5	
8-10	9 11 11 12	10	0.0	Brown, fine to coarse SAND, some silt, some gravel, moist						1	40				
10-12	12 31 13 14	0	NA	NO RECOVERY, wet on outside of spoon at 10.0 feet	10					NA	NA			10.0	
12-14	8 14 13 14	0	NA							NA	NA				
14-16	8 3 2 4	25	15.0	Black, fine to coarse SAND, oil sheen, wet	15					1	40			14.0	
16-18	5 3 4 3	25	18.0							1	40				
18-20	5 6 6 9	75	25.0	Black, fine to coarse SAND, some gravel, oil sheen, wet						1	40				
				Dark brown, SILT and CLAY, trace shell fragments, trace wood fragments, black stain, oil sheen, wet	20									19.3	
				End of boring at 20.0 feet										20.0	

ATLANTIC

BORING LOG 8 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 10/30/90
DATA COMPLETED: 10/30/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 11.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, SUNNY, CLEAR SKIES
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	0 21 31 18	50	0.2	Brown, fine to coarse SAND and GRAVEL, trace cinders, moist, FILL						1	60				
2-4	17 13 11 10	50	9.5	Brown, fine SAND, some silt, trace gravel, moist, FILL						1	40				
4-6	6 6 9 15	25	8.5		5					1	40				
6-8	13 11 12 13	25	20.0	Brown, fine to medium SAND, some silt, wood chips, pockets of black staining, moist, FILL						1	40				
8-10	6 6 9 6	10	5.0	Brown-black, medium SAND and GRAVEL, metal pieces, wet, FILL						1	40				
10-12	6 4 5 8	25	.75	Brown, fine to coarse, SAND and GRAVEL, trace metal wire, wet, FILL	10					1	40				
12-14	100/0			AUGER REFUSAL AT 12.0 feet										12.0	
					15										
					20										

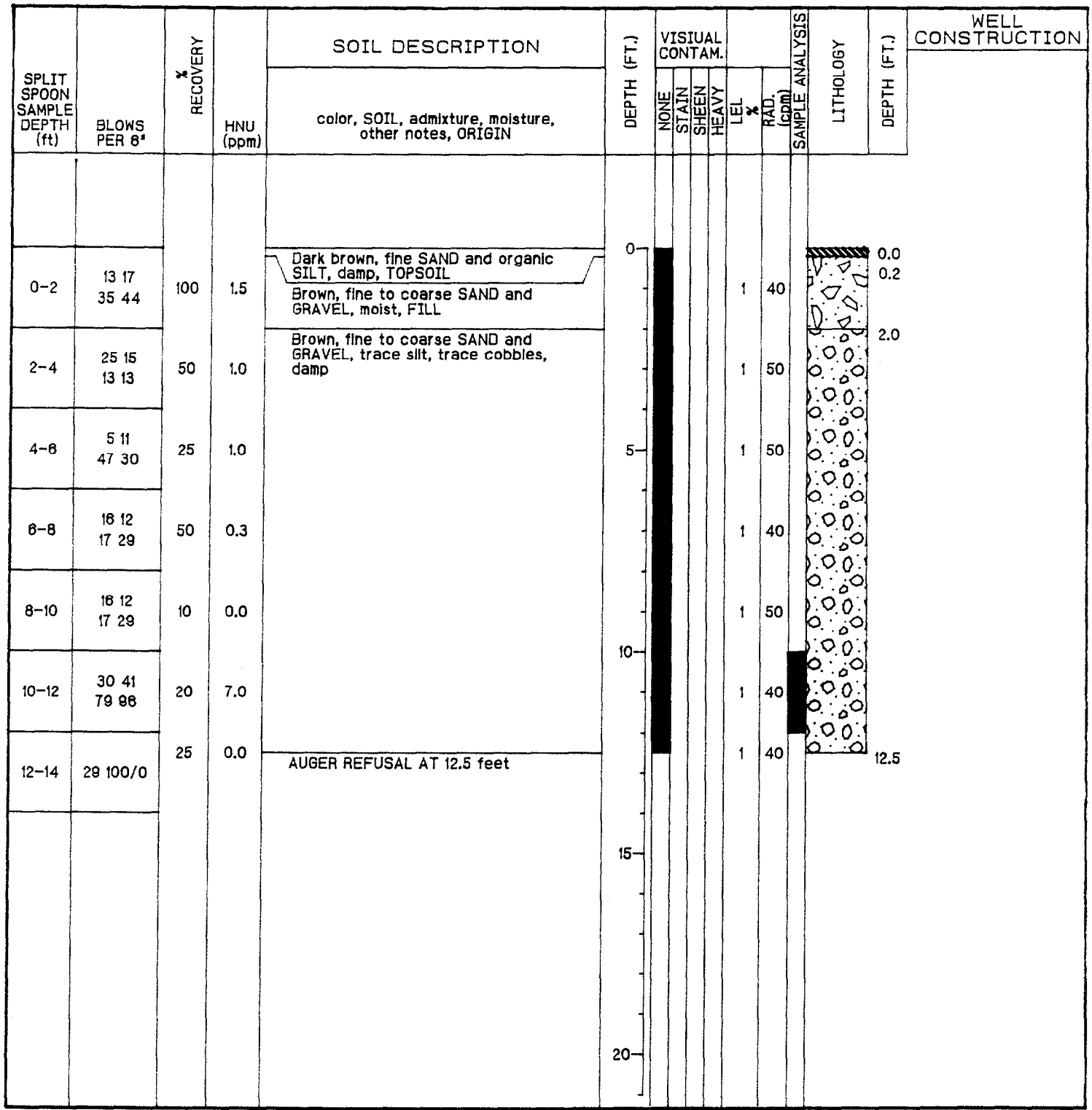
ATLANTIC

BORING LOG 8 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 11/06/90
DATA COMPLETED: 11/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 18.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 50°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	13 17 35 44	100	1.5	Dark brown, fine SAND and organic SILT, damp, TOPSOIL Brown, fine to coarse SAND and GRAVEL, moist, FILL
2-4	25 15 13 13	50	1.0	Brown, fine to coarse SAND and GRAVEL, trace silt, trace cobbles, damp
4-6	5 11 47 30	25	1.0	
6-8	16 12 17 29	50	0.3	
8-10	16 12 17 29	10	0.0	
10-12	30 41 79 96	20	7.0	
12-14	29 100/0	25	0.0	AUGER REFUSAL AT 12.5 feet



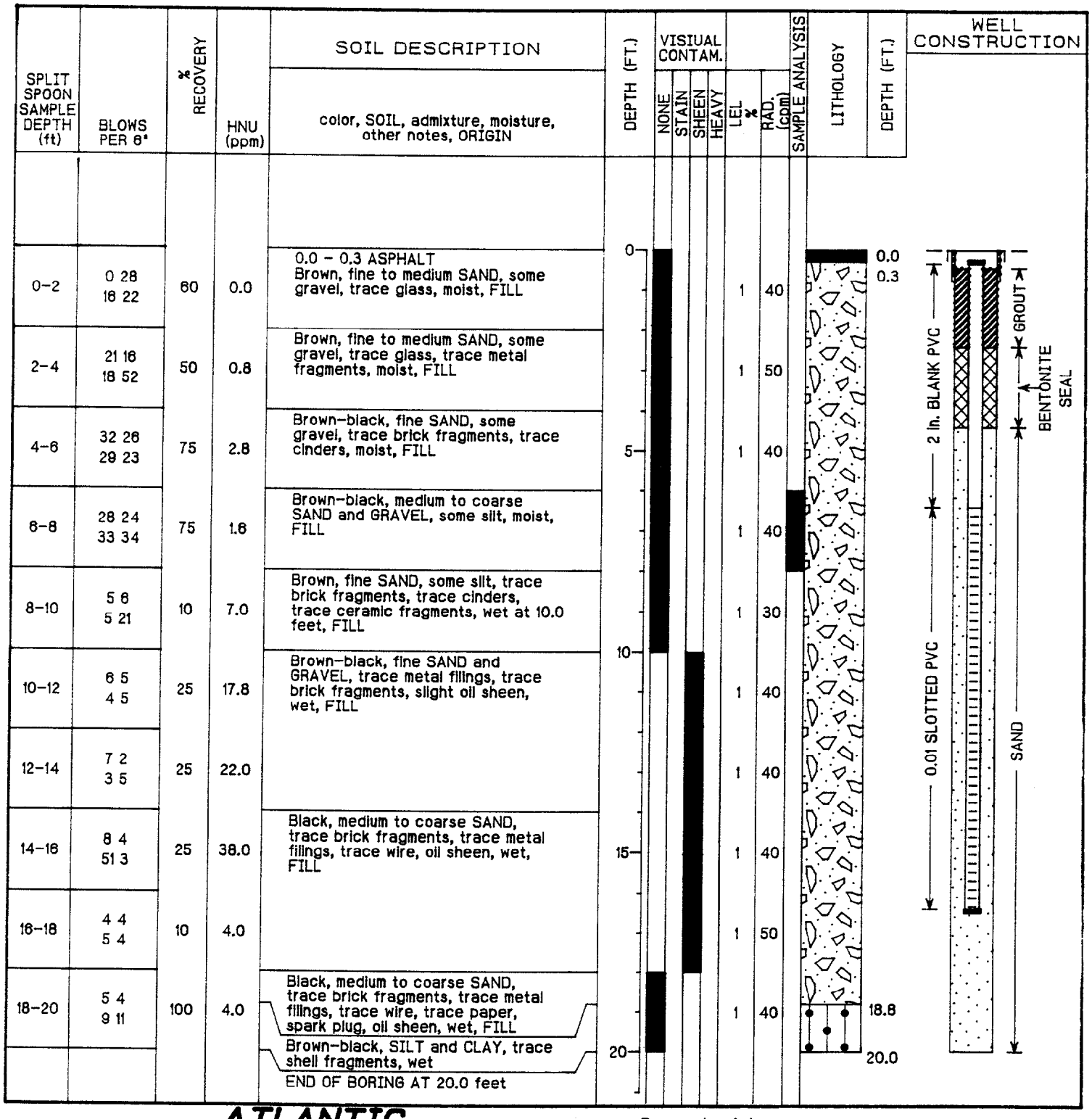
ATLANTIC

BORING LOG 8 MW 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 10/30/90
DATA COMPLETED: 10/30/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 10.48
PROTECTIVE CASING ELEVATION: 10.48
WELL ELEVATION: 10.15
WATER LEVEL: 1.47 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, CLEAR SKIES
INSPECTOR: ERIK NESS AND LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	0 28 18 22	60	0.0	0.0 - 0.3 ASPHALT Brown, fine to medium SAND, some gravel, trace glass, moist, FILL
2-4	21 16 18 52	50	0.8	Brown, fine to medium SAND, some gravel, trace glass, trace metal fragments, moist, FILL
4-6	32 26 29 23	75	2.8	Brown-black, fine SAND, some gravel, trace brick fragments, trace cinders, moist, FILL
6-8	28 24 33 34	75	1.6	Brown-black, medium to coarse SAND and GRAVEL, some silt, moist, FILL
8-10	5 6 5 21	10	7.0	Brown, fine SAND, some silt, trace brick fragments, trace cinders, trace ceramic fragments, wet at 10.0 feet, FILL
10-12	6 5 4 5	25	17.8	Brown-black, fine SAND and GRAVEL, trace metal filings, trace brick fragments, slight oil sheen, wet, FILL
12-14	7 2 3 5	25	22.0	
14-16	8 4 51 3	25	38.0	Black, medium to coarse SAND, trace brick fragments, trace metal filings, trace wire, oil sheen, wet, FILL
16-18	4 4 5 4	10	4.0	
18-20	5 4 9 11	100	4.0	Black, medium to coarse SAND, trace brick fragments, trace metal filings, trace wire, trace paper, spark plug, oil sheen, wet, FILL Brown-black, SILT and CLAY, trace shell fragments, wet END OF BORING AT 20.0 feet



ATLANTIC

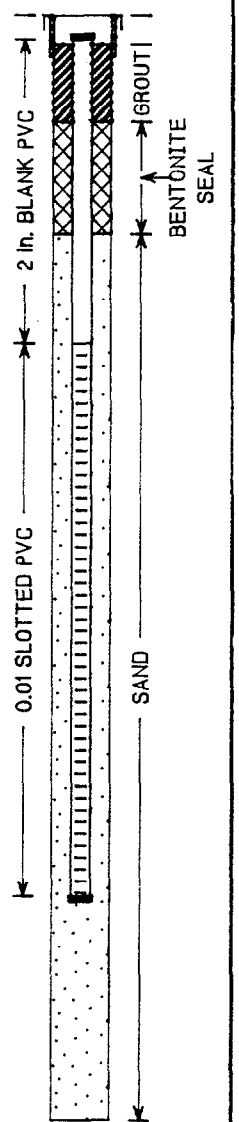
BORING LOG 8 MW 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 11/06/90
DATA COMPLETED: 11/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 9.91
PROTECTIVE CASING ELEVATION: 9.91
WELL ELEVATION: 9.43
WATER LEVEL: 2.45 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, PARTLY CLOUDY, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
0-2	0 33 51 85	75	4.5	0.0 - 0.3 ASPHALT 0.3 - 1.5 Light brown, fine to coarse SAND and GRAVEL, trace cobbles,damp, FILL 2.0 - 6.0 Grey, fine to coarse SAND, broken glass, ash, metal fragments, damp, grading to rust color	0					2	40			0.0
2-4	23 39 40 43	50	8.0							2	40			
4-6	81 100/3	1	NA		5					NA	NA			
6-8	17 21 18 15	50	4.0	Grey, fine to coarse SAND, some silt, trace gravel, moist						1	40			6.0
8-10	17 33 50 50	75	9.0	Grey, fine to medium SAND, some gravel, some silt, moist						1	30			8.5
10-12	21 17 14 23	50	35	Grey, fine to coarse SAND and GRAVEL, some silt, black stain from 13.5 -14.0, wet	10					1	40			10.0
12-14	11 4 2 4	25	15							1	40			
14-16	6 4 6 4	0	NA	NO RECOVERY	15					NA	NA			14.0
16-18	4 5 4 4	0	NA							NA	NA			
18-20	5 6 6 7	75	5.0	Grey, fine SAND and SILT, trace clay, trace shell fragments, wet						1	50			18.0
				End of boring at 20.0 feet	20									20.0

WELL CONSTRUCTION



ATLANTIC

BORING LOG 8 MW 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 11/06/90
DATA COMPLETED: 11/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 9.91
PROTECTIVE CASING ELEVATION: 9.91
WELL ELEVATION: 9.43
WATER LEVEL: 2.73 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, PARTLY CLOUDY, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	0 31 67 100	100	3.0	0.0 - 0.3 ASPHALT Brown, fine to coarse SAND and GRAVEL, trace cobbles, damp, FILL
2-4	50 45 35 15	75	10.0	Dark brown, fine to coarse SAND and GRAVEL, some silt, trace glass, trace metal filings, damp, FILL
4-6	7 8 35 50	25	10.0	
6-8	29 45 99 85	75	5.0	Light brown, fine to coarse SAND and GRAVEL, trace silt, trace cobbles, moist, FILL Black, fine to medium SAND, some gravel, some silt, trace metal fragments, moist, FILL
8-10	50 48 23 19	75	200	Grey, fine to coarse SAND and GRAVEL, some silt, moist, FILL Grey, fine to coarse SAND and GRAVEL, some cobbles, moist, FILL
10-12	11 5 4 5	0	NA	Grey, fine to coarse SAND and GRAVEL, some cobbles, trace broken glass, trace wood fragments, moist, FILL NO RECOVERY
12-14	5 4 6 4	0	NA	
14-16	4 3 4 5	0	NA	
16-18	4 2 1 1	0	NA	
18-20	2 1 1 2	50	40.0	Black, medium to coarse SAND, trace silt, wet Grey, fine SAND and SILT, trace clay, trace shell fragments, wet END OF BORING AT 20.0 feet

DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	40	
					1	40	
5					1	50	
					1	40	
					1	40	
10					NA	NA	
					NA	NA	
15					NA	NA	
					NA	NA	
					1	40	
20							

LITHOLOGY: 0.0 - 9.5 FILL; 9.5 - 18.0 SAND; 18.0 - 19.5 SILT; 19.5 - 20.0

WELL CONSTRUCTION: 0.0 GROUT; BENTONITE SEAL; 2 in. BLANK PVC; 0.01 SLOTTED PVC; SAND; 20.0

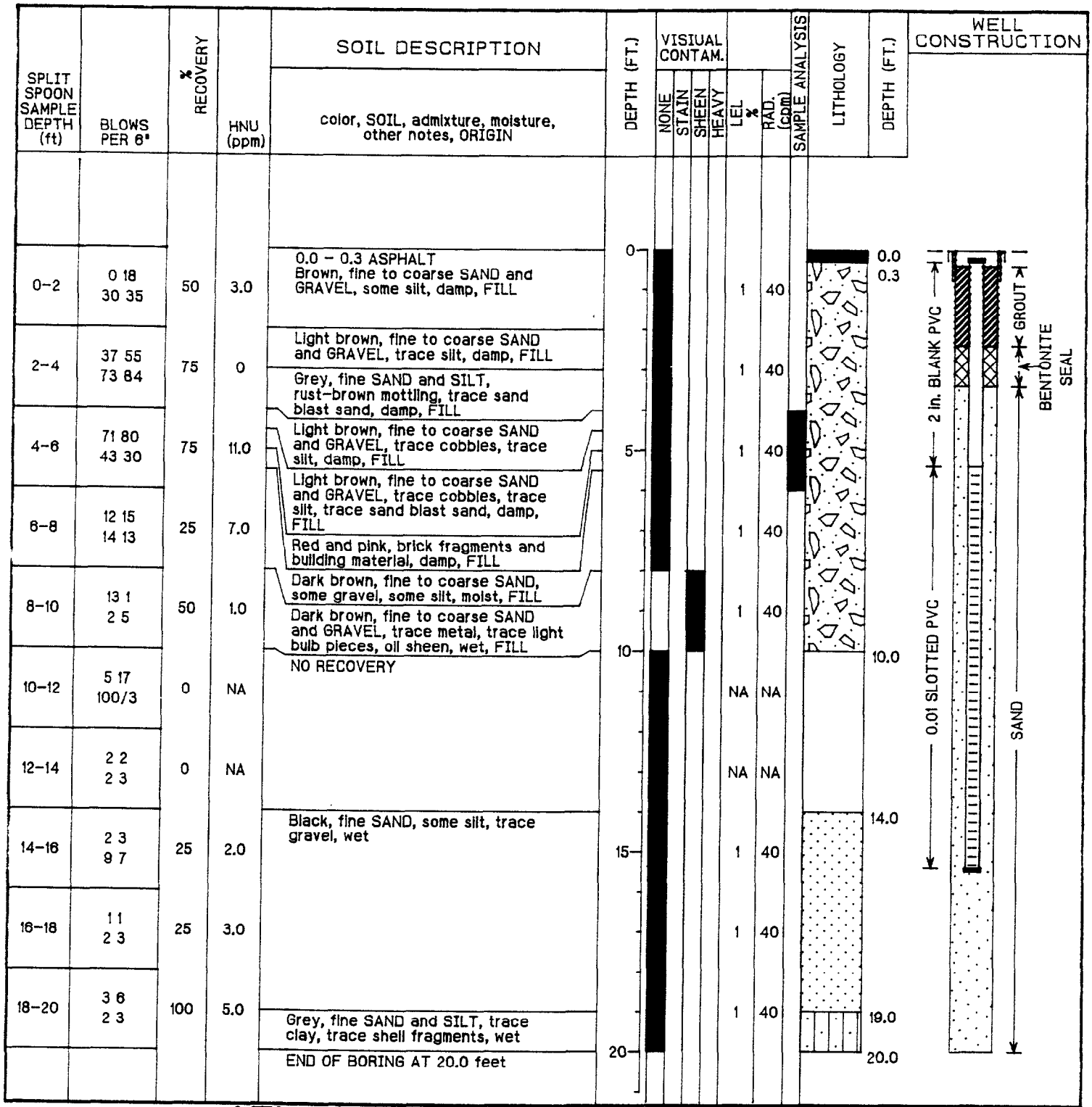
ATLANTIC

BORING LOG 8 MW 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: GOSS COVE
DATE STARTED: 11/06/90
DATA COMPLETED: 11/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 9.62
PROTECTIVE CASING ELEVATION: 9.62
WELL ELEVATION: 9.34
WATER LEVEL: 3.05 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	0 18 30 35	50	3.0	0.0 - 0.3 ASPHALT Brown, fine to coarse SAND and GRAVEL, some silt, damp, FILL
2-4	37 55 73 84	75	0	Light brown, fine to coarse SAND and GRAVEL, trace silt, damp, FILL Grey, fine SAND and SILT, rust-brown mottling, trace sand blast sand, damp, FILL
4-6	71 80 43 30	75	11.0	Light brown, fine to coarse SAND and GRAVEL, trace cobbles, trace silt, damp, FILL Light brown, fine to coarse SAND and GRAVEL, trace cobbles, trace silt, trace sand blast sand, damp, FILL
6-8	12 15 14 13	25	7.0	Red and pink, brick fragments and building material, damp, FILL
8-10	13 1 2 5	50	1.0	Dark brown, fine to coarse SAND, some gravel, some silt, moist, FILL Dark brown, fine to coarse SAND and GRAVEL, trace metal, trace light bulb pieces, oil sheen, wet, FILL
10-12	5 17 100/3	0	NA	NO RECOVERY
12-14	2 2 2 3	0	NA	
14-16	2 3 9 7	25	2.0	Black, fine SAND, some silt, trace gravel, wet
16-18	1 1 2 3	25	3.0	
18-20	3 6 2 3	100	5.0	Grey, fine SAND and SILT, trace clay, trace shell fragments, wet
				END OF BORING AT 20.0 feet



ATLANTIC

SPENT ACID STORAGE AND DISPOSAL AREA

BORING LOG 15 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: SPENT ACID STORAGE
DATE STARTED: 10/18/90
DATA COMPLETED: 10/18/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 28.5
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 70°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	14 5 4 8	50	0.4	0.0 - 0.1 ASPHALT Brown, fine to coarse SAND, some gravel, orange staining, damp
2-4	6 4 3 3	50	0.4	
4-6	4 6 5 4	50	0.4	Brown, fine to medium SAND, trace silt, trace clay, orange staining, damp
6-8	3 4 4 3	50	11.0	
8-10	7 9 8 9	50	1.8	Grey, fine to coarse SAND, some silt, wet at top
10-12	3 6 5 5	50	0.4	
12-14	4 5 7 8	100	0.4	
14-16	4 4 4 5	75	1.0	Grey, fine SAND, trace silt, wet
16-18	5 5 4 5	75	0.4	
18-20	6 7 8 7	100	0.4	Grading to some silt, rust colored mottling, wet END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	50	
					1	50	
5					1	30	
					1	30	
					1	60	
10						40	
					1	40	
15					1	40	
					1	40	
20					1	40	

LITHOLOGY

WELL CONSTRUCTION

DEPTH (FT.): 0.0, 0.1, 4.0, 8.0, 15.0, 20.0

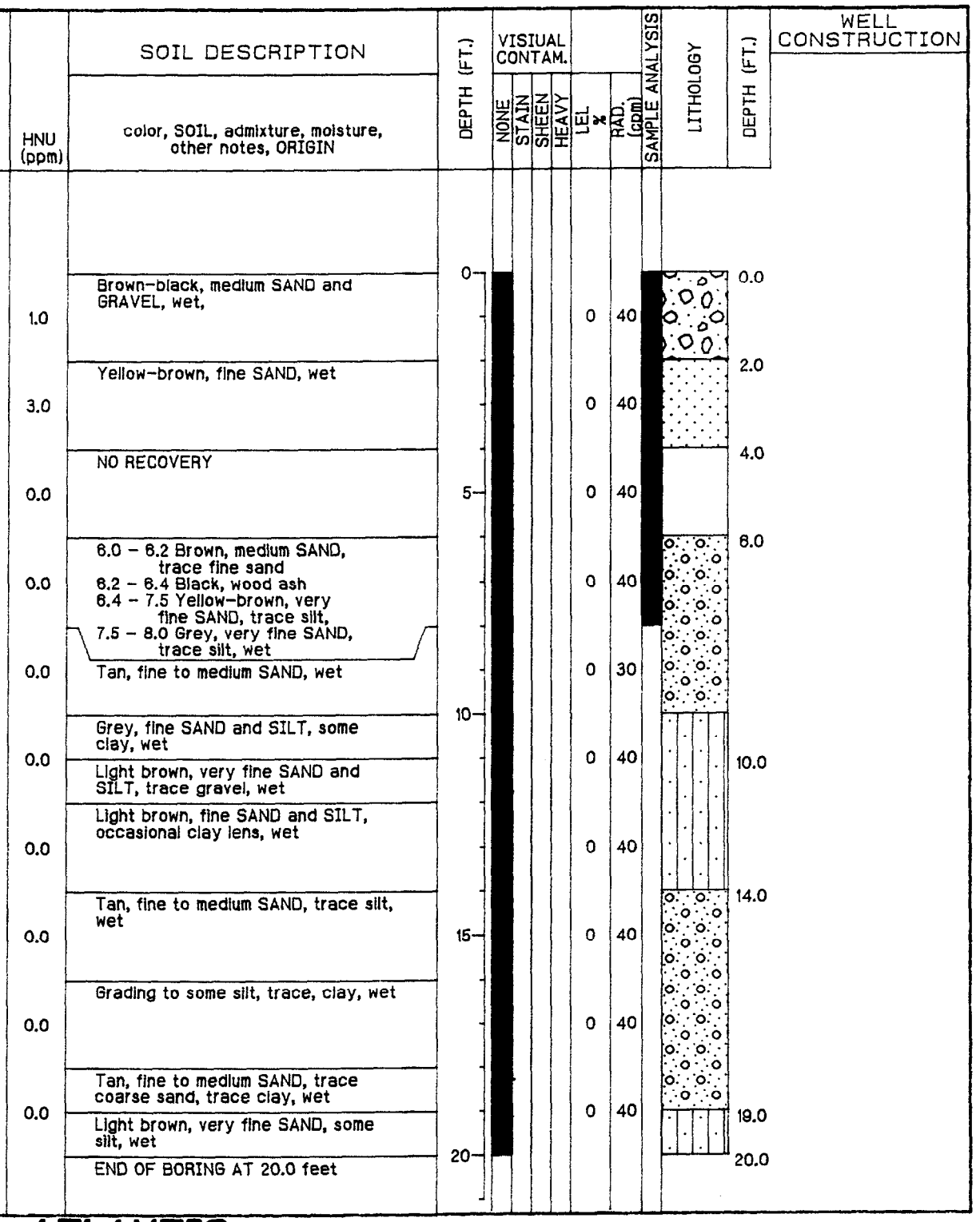
ATLANTIC

BORING LOG 15 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: SPENT ACID STORAGE
DATE STARTED: 10/23/90
DATA COMPLETED: 10/23/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 28.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, RAIN
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	11 7 5 4	20	1.0	Brown-black, medium SAND and GRAVEL, wet,
2-4	7 7 3 7	50	3.0	Yellow-brown, fine SAND, wet
4-6	7 3 5 6	NR	0.0	NO RECOVERY
6-8	4 5 10 13	100	0.0	6.0 - 6.2 Brown, medium SAND, trace fine sand 6.2 - 6.4 Black, wood ash 6.4 - 7.5 Yellow-brown, very fine SAND, trace silt, 7.5 - 8.0 Grey, very fine SAND, trace silt, wet
8-10	10 7 10 8	100	0.0	Tan, fine to medium SAND, wet
10-12	9 5 5 8	75	0.0	Grey, fine SAND and SILT, some clay, wet Light brown, very fine SAND and SILT, trace gravel, wet
12-14	4 4 7 6	100	0.0	Light brown, fine SAND and SILT, occasional clay lens, wet
14-16	7 5 5 5	100	0.0	Tan, fine to medium SAND, trace silt, wet
16-18	5 7 7 8	100	0.0	Grading to some silt, trace, clay, wet
18-20	7 8 7 6	100	0.0	Tan, fine to medium SAND, trace coarse sand, trace clay, wet Light brown, very fine SAND, some silt, wet
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 15 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: SPENT ACID STORAGE
DATE STARTED: 10/24/90
DATA COMPLETED: 10/24/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: FRANK WARE
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 28.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, CLOUDY SKIES
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	10 10 20 10	50	0.0	Brown, fine to medium SAND and GRAVEL, moist
2-4	10 8 8 5	75	0.0	Brown to orange mottled, fine SAND, trace silt, trace wood fragments at top, moist
4-6	1 1 3 4	50	0.0	
6-8	10 3 6 10	50	0.0	
8-10	7 7 7 6	100	0.0	Grey, fine to medium SAND, some silt, wet
10-12	3 7 7 10	100	0.0	Grey, fine to medium SAND, trace silt, wet Light brown, very fine SAND and SILT, trace clay, iron staining, wet
12-14	1 1 3 2	50	0.0	Grading to fine to very fine SAND and SILT, wet
14-16	5 8 7 8	75	4.0	Grading to very fine SAND and SILT, trace clay, iron staining, wet
16-18	3 4 3 4	50	3.0	Light brown, fine SAND and SILT, wet
18-20	7 4 5 6	100	0.0	Tan-grey, fine to very fine SAND, trace silt, wet Light brown, very fine SAND, some silt, wet
				END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
0					0	50			0.0	
5					0	60			2.0	
					0	80				
					0	40				
10					0	40			8.0	
					0	40			11.0	
					0	40				
15					0	40				
					0	40			18.0	
					0	50				
20									20.0	

ATLANTIC

FORMER GASOLINE STATION

BORING LOG 18 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: FORMER GASOLINE STATION
DATE STARTED: 11/01/90
DATA COMPLETED: 11/01/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 34.5
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: LYNN METCALF AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	19 14 16 18	25	1.0	Brown, fine to medium SAND and GRAVEL, moist						1	60			2.0	
2-4	9 7 5 4	0	NA	NO RECOVERY						NA	NA			4.0	
4-6	3 4 3 3	10	0.0	Brown, fine SAND, trace silt, trace ash, moist	5					1	50			6.0	
6-8	2 1 2 2	50	0.0	Brown, fine to medium SAND, trace gravel, trace silt, moist						1	40				
8-10	17 19 21 42	75	7.5							1	50			10.0	
10-12	37 30 41 43	75	7.5	Brown, fine to coarse SAND and GRAVEL, moist	10					1	60				
12-14	31 23 11 12	75	1.0							1	40			13.5	
14-16	14 11 11 15	80	0.8	Light brown, fine SAND, trace gravel, moist	15					1	40				
16-18	17 10 12 13	80	25.0							1	50				
18-20	17 10 9 11	60	0.5							1	40				
				END OF BORING at 20.0 feet	20									20.0	

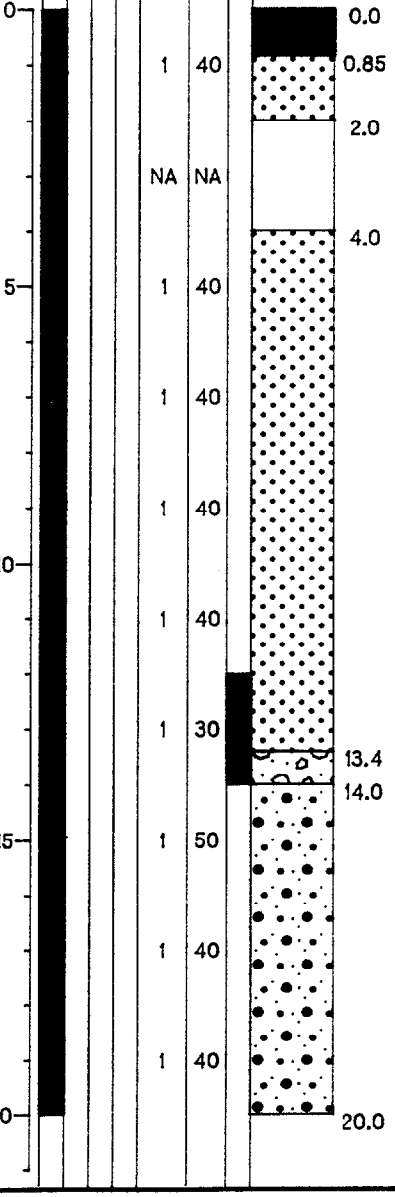
ATLANTIC

BORING LOG 18 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: FORMER GASOLINE STATION
DATE STARTED: 11/01/90
DATA COMPLETED: 11/01/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 34.8
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: LYNN METCALF AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	VISIUAL CONTAM.	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
					NONE / STAIN / SHEEN / HEAVY			
0-2	AUGER 17 12	25	0.0	0.0 - 0.1 ASPHALT 0.1 - 0.85 CONCRETE Brown, medium SAND trace gravel, moist		1	40	
2-4	6 6 6 6	0	NA	NO RECOVERY		NA	NA	
4-6	4 5 4 4	25	0.0	Brown, medium SAND, some gravel, trace silt, moist		1	40	
6-8	3 2 2 2	25	2.0			1	40	
8-10	3 2 2 2	10	0.0			1	40	
10-12	4 6 7 6	5	0.0			1	40	
12-14	9 9 8 7	50	7.5			1	30	
				Light brown, medium to coarse SAND and GRAVEL, moist				
14-16	6 9 10 8	50	0.5	Light brown, fine to coarse SAND, trace gravel, moist		1	50	
16-18	6 8 8 8	75	4.0			1	40	
18-20	12 8 10 11	50	0.5			1	40	
				END OF BORING AT 20.0 feet				



WELL CONSTRUCTION

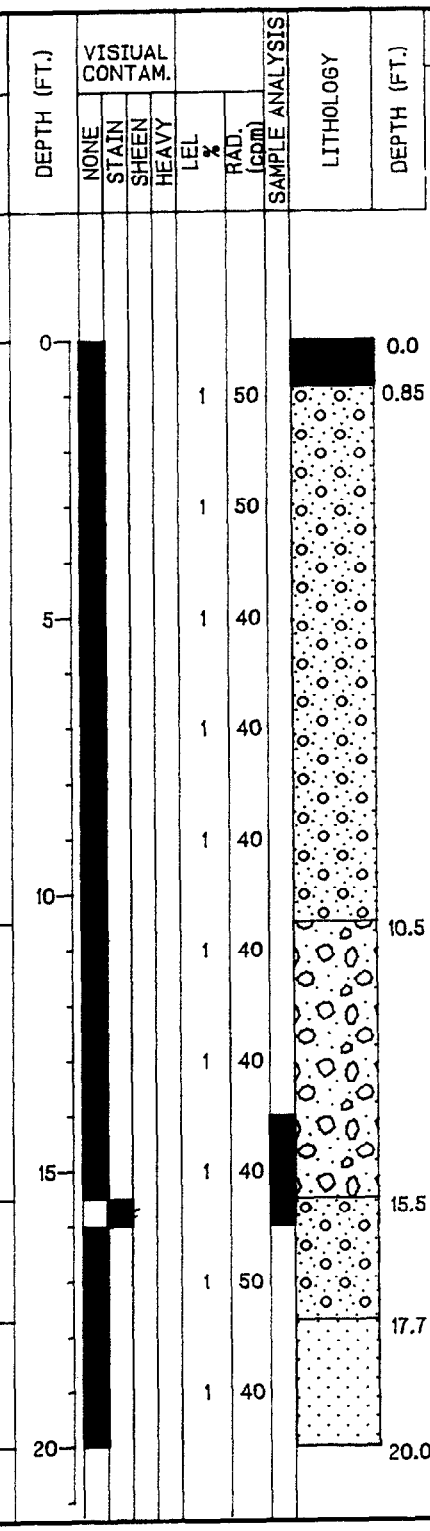
ATLANTIC

BORING LOG 18 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: FORMER GASOLINE STATION
DATE STARTED: 11/01/90
DATA COMPLETED: 11/01/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 35.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: LYNN METCALF AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	AUGER 5 4	100	1.5	0.0 - 0.1 ASPHALT 0.1 - 0.85 CONCRETE Brown, fine to medium SAND, some gravel, trace silt, moist
2-4	3 2 1 3	75	11.0	
4-6	6 17 16 14	100	7.5	
6-8	10 12 9 12	75	9.0	
8-10	17 16 21 21	75	10.0	
10-12	24 37 31 24	60	4.0	Light brown, medium to coarse SAND and GRAVEL, moist
12-14	29 19 18 17	50	9.0	
14-16	15 11 11 10	60	15.0	
16-18	4 10 11 13	50	12.0	Light brown, fine to medium SAND, zones of brown staining, moist
18-20	10 12 16 12	60	11.0	Light brown, fine SAND, grading to tan-gray color, moist
				END OF BORING AT 20.0 feet



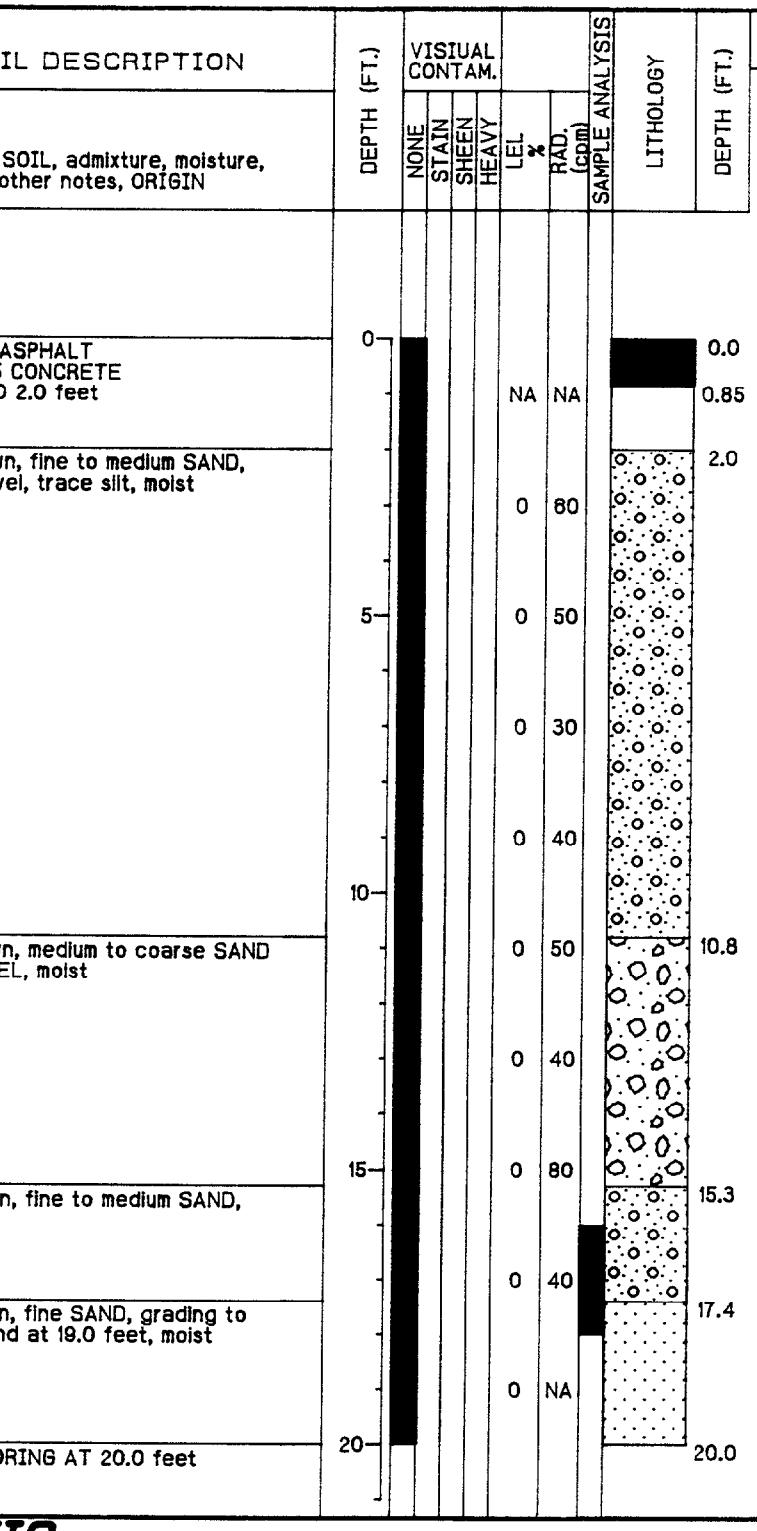
ATLANTIC

BORING LOG 18 TB 4

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1258-10
LOCATION: FORMER GASOLINE STATION
DATE STARTED: 11/01/90
DATA COMPLETED: 11/01/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 35.4
PROTECTIVE CASING ELEVATION: –
WELL ELEVATION: –
WATER LEVEL: –
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: LYNN METCALF, ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0–2	AUGER	30	NA	0.0 – 0.1 ASPHALT 0.1 – 0.85 CONCRETE AUGER TO 2.0 feet
2–4	4 4 5 6	75	0.0	Dark brown, fine to medium SAND, some gravel, trace silt, moist
4–6	12 11 10 13	75	1.0	
6–8	6 6 7 11	75	1.5	
8–10	20 17 26 21	100	1.3	
10–12	27 30 30 34	60	0.5	Light brown, medium to coarse SAND and GRAVEL, moist
12–14	30 29 22 32	100	1.0	
14–16	25 17 12 11	60	1.0	Light brown, fine to medium SAND, moist
16–18	13 9 5 10	75	1.0	Light brown, fine SAND, grading to coarse sand at 19.0 feet, moist
18–20	9 7 9 11	50	NA	
				END OF BORING AT 20.0 feet



WELL CONSTRUCTION

ATLANTIC

BORING LOG 18 TB 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: FORMER GASOLINE STATION
DATE STARTED: 11/01/90
DATA COMPLETED: 11/01/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 35.4
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: LYNN METCALF, ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	AUGER 16 18	30	NA	0.0 - 0.1 ASPHALT 0.1 - 0.85 CONCRETE AUGER TO 2.0 feet						NA	NA			0.85	
2-4	18 17 18 16	50	0.0	Brown, fine to medium SAND, some gravel, trace silt, moist						0	50			2.0	
4-6	11 7 6 9	60	0.0		5					0	40				
6-8	12 10 11 16	40	0.0							0	40				
8-10	15 17 27 36	75	3.5							0	40				
10-12	35 40 52 41	80	8.5		10					0	80				
12-14	17 15 15 16	90	6.0	Light brown, fine to coarse SAND and GRAVEL, moist						0	60			11.65	
14-16	18 19 15 14	0	NA	NO RECOVERY	15					NA	NA			14.0	
16-18	11 9 10 10	50	NA	Light brown, fine to coarse SAND and GRAVEL, moist						0	50			16.0	
18-20	10 9 9 9	75	4.5	Light brown, fine to medium SAND, trace gravel, moist						0	40			18.0	
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

AREA A

BORING LOG 2W TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/05/90
DATA COMPLETED: 9/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 67.5
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	WOH 1	0	NA	WATER AND ROOTS						NA	NA			2.0	
2-4	WOH	0	NA	NO RECOVERY						NA	NA				
4-6	WOH	0	NA		5					NA	NA				
6-8	WOH	0	NA							NA	NA			8.0	
8-10	WOH	30	1.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL						0	30				
10-12	WOH	100	1.0		10					0	30			12.0	
				AUGER TO 15.0 feet											
15-17	WOH 1 1 1	100	12.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	15					0	30			15.0	
				AUGER TO 20.0 feet										17.0	
20-22		100	17.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	20					0	30			20.0	

ATLANTIC

BORING LOG 2W TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/05/90
DATA COMPLETED: 9/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 67.5
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
20-22				AUGER TO 25.0 feet	21									22.0	
25-27		100	8.0	Grading to little clay, little sand	26					0	30			25.0	
				AUGER TO 30.0 feet										27.0	
30-32		100	1.0	Dark grey, SILT, little clay, little sand, trace shell fragments, wet, DREDGE SPOIL	31					0	30			30.0	
				Dark brown, organic SILT and CLAY, trace fine sand, trace roots, TOP SOIL										31.7	
				END BORING AT 32.0 feet										32.0	
					36										
					41										

ATLANTIC

BORING LOG 2W TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/06/90
DATA COMPLETED: 9/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 68.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 70°, FOGGY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	WOH 1	100	0.4	Red brown, organic silt, some roots, moist						1	40			1.0	
2-4	WOH	100	0.6	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL						1	30				
4-6	WOH	100	1.0		5					1	50				
				AUGER TO 10.0 feet										6.0	
10-12	WOH 1 1	100	3.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	10					1	50			10.0	
				AUGER TO 15.0 feet										12.0	
15-17	WOH 1 1	100	3.00	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	15					1	50			15.0	
				AUGER TO 20.0 feet										17.0	
20-22	WOH WOH 1 1	100	19.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	20					1	50			20.0	

ATLANTIC

BORING LOG 2W TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/06/90
DATA COMPLETED: 9/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 68.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 70°, FOGGY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21										
20-22	WOH WOH 1 1														
				AUGER TO 25.0 feet										22.0	
														25.0	
25-27	WOH WOH 2 1	100	7.0	Dark grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	26					1	40				
				AUGER TO 30.0 feet										27.0	
														30.0	
30-32	WOH 3 3	100	1.0	Dark grey, SILT, little clay, little sand, trace shell fragments, wet, DREDGE SPOIL	31					1	40			31.6	
				Dark brown, organic SILT and CLAY, trace fine sand, trace roots, TOP SOIL										31.9	
				Grey, fine SAND and SILT, trace clay, wet,										32.0	
				END BORING AT 32.0 feet											
					36										
					41										

ATLANTIC

BORING LOG 2W TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: AREA A WETLAND
DATE STARTED: 8/31/90
DATA COMPLETED: 8/31/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 71.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, HAZY, HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	11 11	0	NA	ALL ROOTS AND WATER						NA	NA				
2-4	WOH	0	NA							NA	NA				
4-6	WOH	100	0.6	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL	5					0	30				
				AUGER TO 10.0 feet										6.0	
10-12	WOH	100	14.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL	10					0	30			10.0	
				AUGER TO 15.0 feet										12.0	
15-17	WOH	100	8.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL	15					0	30			15.0	
				AUGER TO 20.0 feet										17.0	
20-22	11 11	100	10.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL	20					0	30			20.0	

BORING LOG 2W TB 3

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 8/31/90
DATA COMPLETED: 8/31/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 71.9
PROTECTIVE CASING ELEVATION: –
WELL ELEVATION: –
WATER LEVEL: –
DATUM: SUBASE
WEATHER: 85°, HAZY, HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21										
20–22	11 11														
				AUGER TO 25.0 feet										22.0	
														25.0	
25–27	11 10 60	100	NA	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL	26					NA	NA			26.0	
				Dark brown, organic SILT and CLAY, trace fine sand, trace roots, wet, TOP SOIL										26.3	
				Grey, fine SAND and SILT, trace clay, wet,										27.0	
				END BORING AT 27.0 feet											
					31										
					36										
					41										

BORING LOG 2W TB 4

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/06/90
DATA COMPLETED: 9/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 83.5
PROTECTIVE CASING ELEVATION: –
WELL ELEVATION: –
WATER LEVEL: –
DATUM: SUBASE
WEATHER: 80°, HAZY, HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
0–2	6 100/4	40	0.2	Dark brown, organic SILT and CLAY, trace fine sand, trace roots, damp, TOP SOIL	0					0	30			0.0	
				Grey, fine SAND and SILT, trace clay, damp										0.3	
				AUGER REFUSAL AT 0.83 feet.										0.83	
					5										
					10										
					15										
					20										

ATLANTIC

BORING LOG 2W TB 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/06/90
DATA COMPLETED: 9/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 70.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 80°, HAZY, HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	WOH 11	50	0.2	Dark brown, ORGANIC SILT and ROOTS, wet Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL
2-4	WOH	100	0.2	
4-6	WOH	100	7.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL
				AUGER TO 10.0 feet
10-12	WOH	0	NA	NO RECOVERY
12-14	WOH 1 11	0	NA	
				AUGER TO 15.0 feet
15-17	WOH 1	100	5.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL
				AUGER TO 20.0 feet
20-22	WOH 1 11	100	5.0	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
0									0.0	
					1	30			0.3	
					1	30				
5					1	50			6.0	
10					NA	NA			10.0	
					NA	NA				
									14.0	
15					1	40			15.0	
									17.0	
20					1	40			20.0	

ATLANTIC

BORING LOG 2W TB 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/06/90
DATA COMPLETED: 9/06/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 70.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 80°, HAZY, HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21									22.0	
20-22	WOH 1 11			AUGER TO 25.0 feet										25.0	
25-27	22 100/3	40	0.2	Grey, SILT and CLAY, little fine sand, trace shell fragments, wet, DREDGE SPOIL, end of spoon had weathered rock. AUGER REFUSAL AT 25.7 feet	26					1	40			25.7	
					31										
					36										
					41										

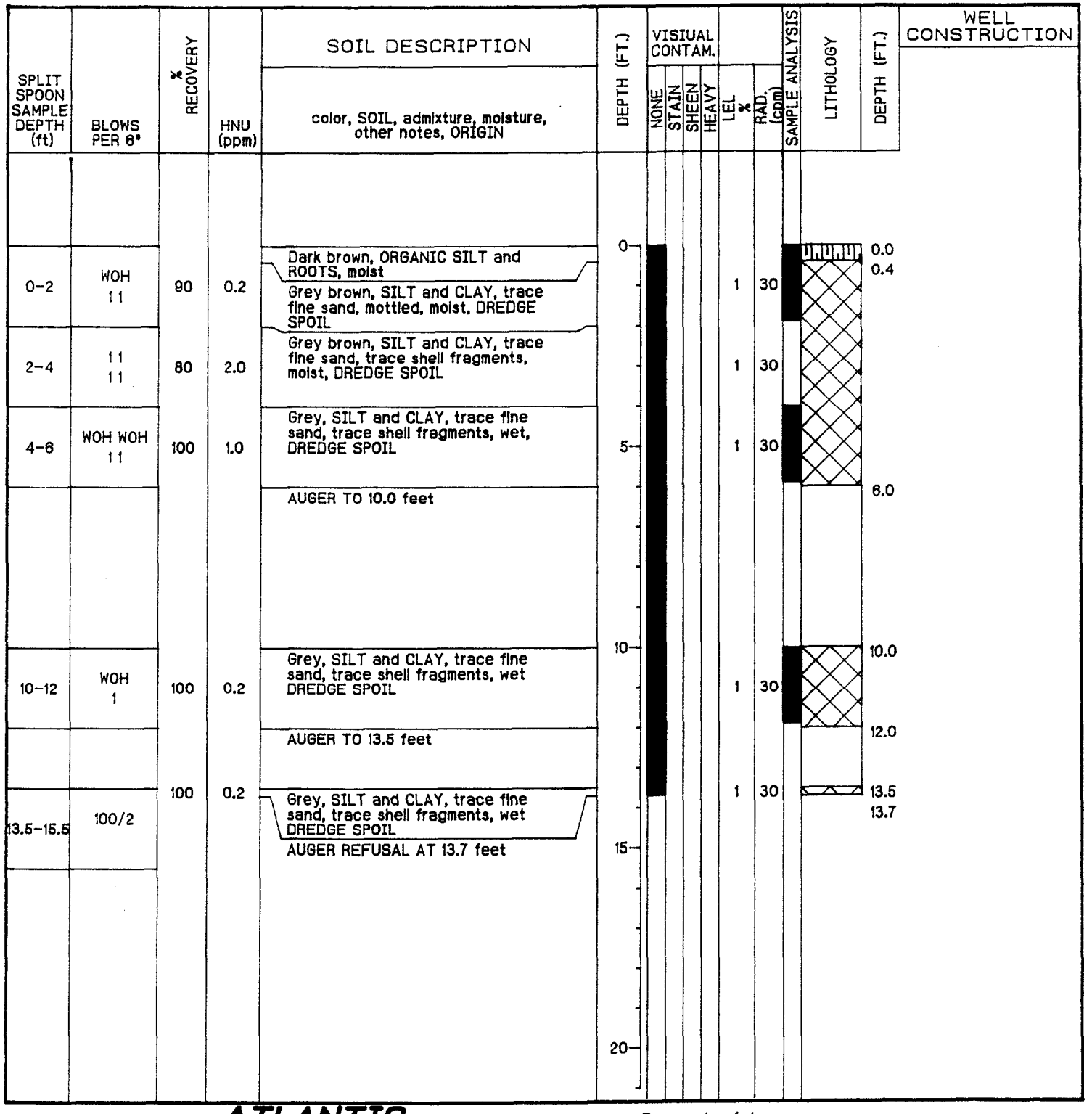
ATLANTIC

BORING LOG 2W TB 7

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/05/90
DATA COMPLETED: 9/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 77.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	WOH 11	90	0.2	Dark brown, ORGANIC SILT and ROOTS, moist Grey brown, SILT and CLAY, trace fine sand, mottled, moist, DREDGE SPOIL
2-4	11 11	80	2.0	Grey brown, SILT and CLAY, trace fine sand, trace shell fragments, moist, DREDGE SPOIL
4-6	WOH WOH 11	100	1.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL
				AUGER TO 10.0 feet
10-12	WOH 1	100	0.2	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet DREDGE SPOIL
				AUGER TO 13.5 feet
13.5-15.5	100/2	100	0.2	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet DREDGE SPOIL AUGER REFUSAL AT 13.7 feet



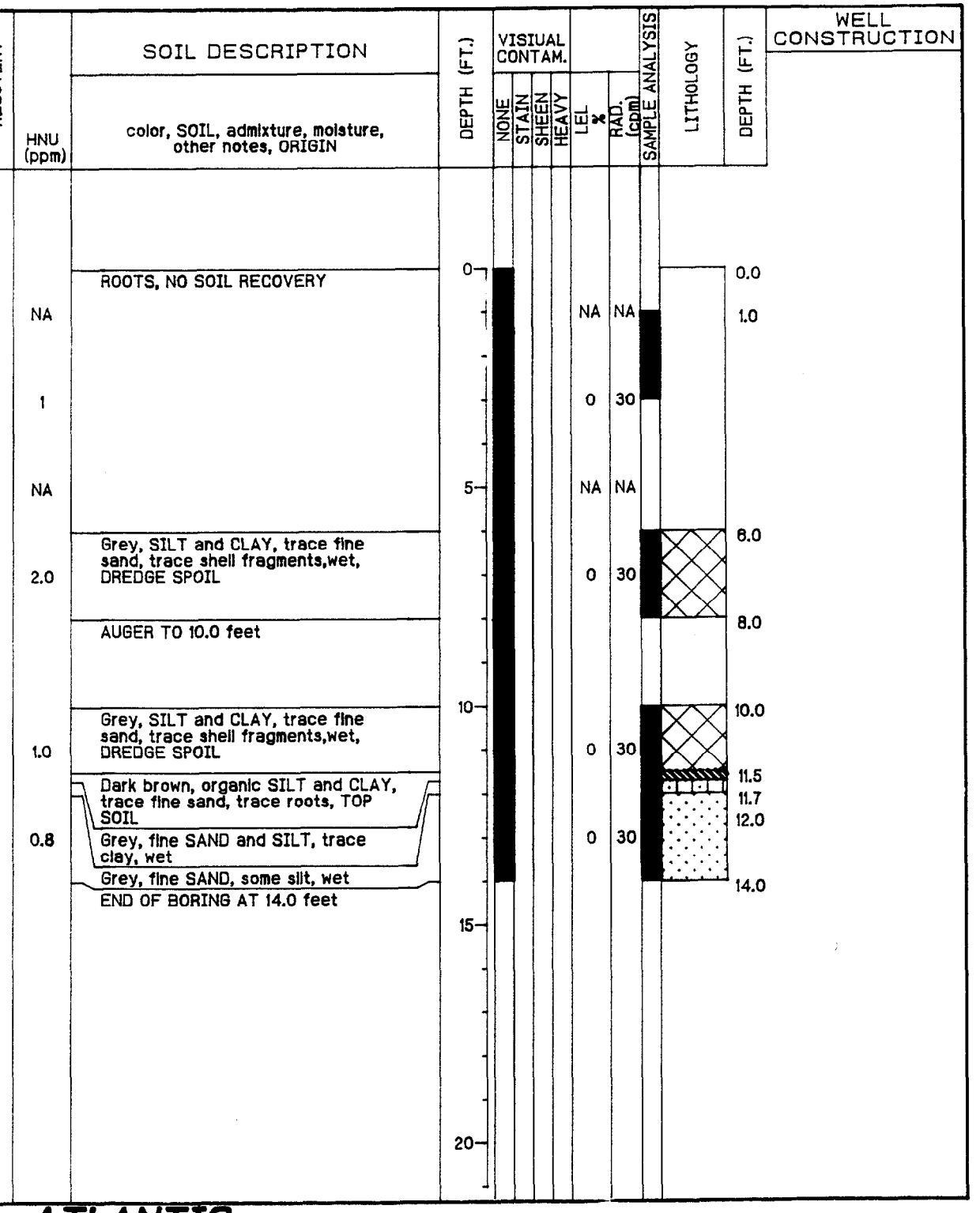
ATLANTIC

BORING LOG 2W TB 8

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 8/30/90
DATA COMPLETED: 8/30/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 79.8
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, HAZY, HOT AND HUMID
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	2 1 1 1	0	NA	ROOTS, NO SOIL RECOVERY
2-4	WOH	30	1	
4-6	WOH 1 1	0	NA	
6-8	1 1 WOH WOH	100	2.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments,wet, DREDGE SPOIL
	AUGER			AUGER TO 10.0 feet
10-12	WOH WOH 1 2	100	1.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments,wet, DREDGE SPOIL
12-14	2 4 8 9	75	0.8	Dark brown, organic SILT and CLAY, trace fine sand, trace roots, TOP SOIL Grey, fine SAND and SILT, trace clay, wet Grey, fine SAND, some silt, wet END OF BORING AT 14.0 feet



ATLANTIC

BORING LOG 2W MW 1S

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 08/24/90
DATA COMPLETED: 08/24/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 128.05
PROTECTIVE CASING ELEVATION: –
WELL ELEVATION: –
WATER LEVEL: –
DATUM: SUBASE
WEATHER: 70°, PARTLY CLOUDY
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0–2	4 8 11 11	85	0.1	Brown, fine to coarse SAND and GRAVEL, trace silt, damp
2–4	11 14 32 100/6	100	0.0	Red-brown, fine SAND and SILT, trace gravel, damp
4–6	100/1	0	NA	AUGER REFUSAL AT 4.0 feet, no water encountered, no well installed

DEPTH (FT.): 0, 5, 10, 15, 20

VISIUAL CONTAM.: NONE, STAIN, SHEEN, HEAVY

SAMPLE ANALYSIS	LEL %	RAD. (cpm)
	0	40
	0	60
	NA	NA

LITHOLOGY

DEPTH (FT.): 0.0, 2.0, 4.0

WELL CONSTRUCTION

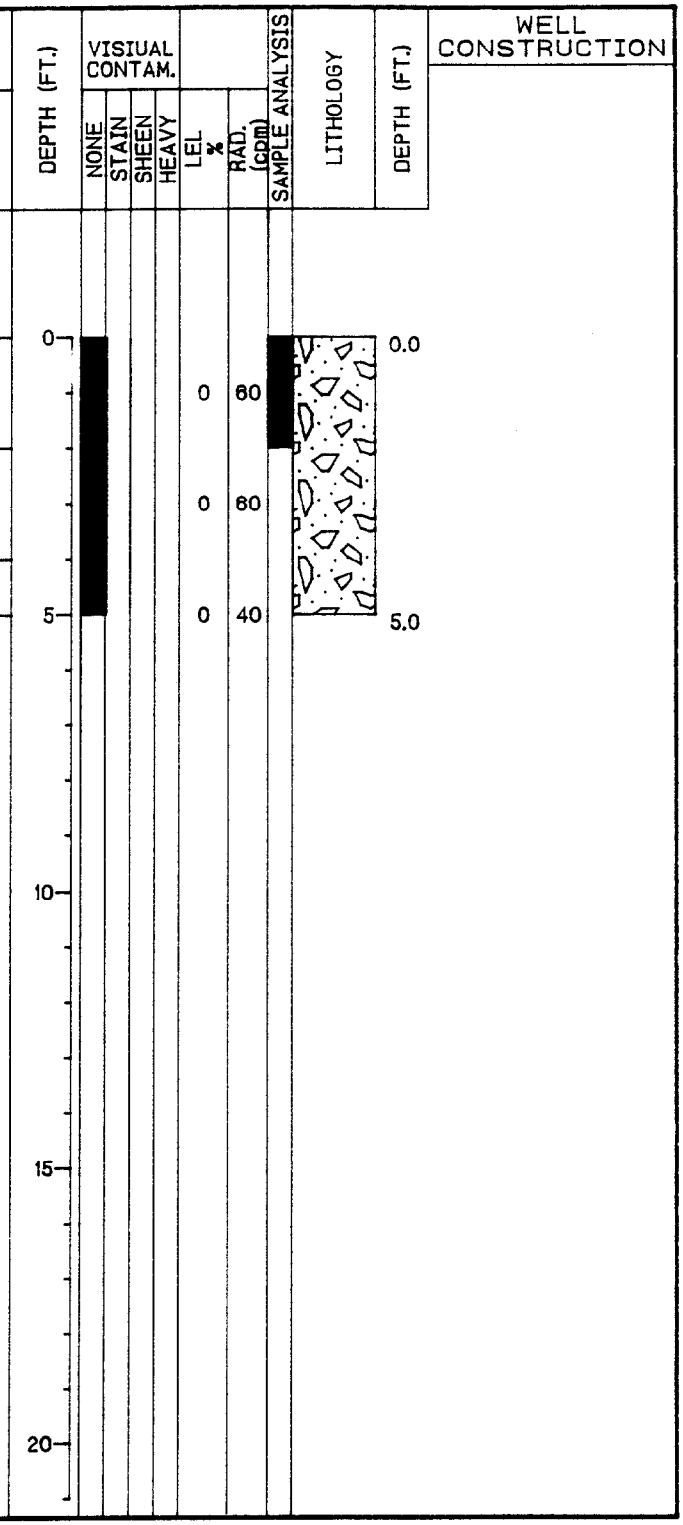
ATLANTIC

BORING LOG 2W MW 2S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 08/23/90
DATA COMPLETED: 08/23/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 110.45
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 70°, CLOUDY
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	4 5 9 10	70	0.0	Brown, medium to coarse SAND and GRAVEL, damp, FILL
2-4	4 5 3 2	45	0.0	Brown, fine SAND and GRAVEL, trace silt, trace asphalt, damp, FILL
4-6	5 64 100/2	50	1.2	Dark brown, fine SAND and SILT, trace asphalt, trace roots, moist, FILL AUGER REFUSAL AT 5.0 feet, no water encountered, no well installed CORED TO 23.0 feet



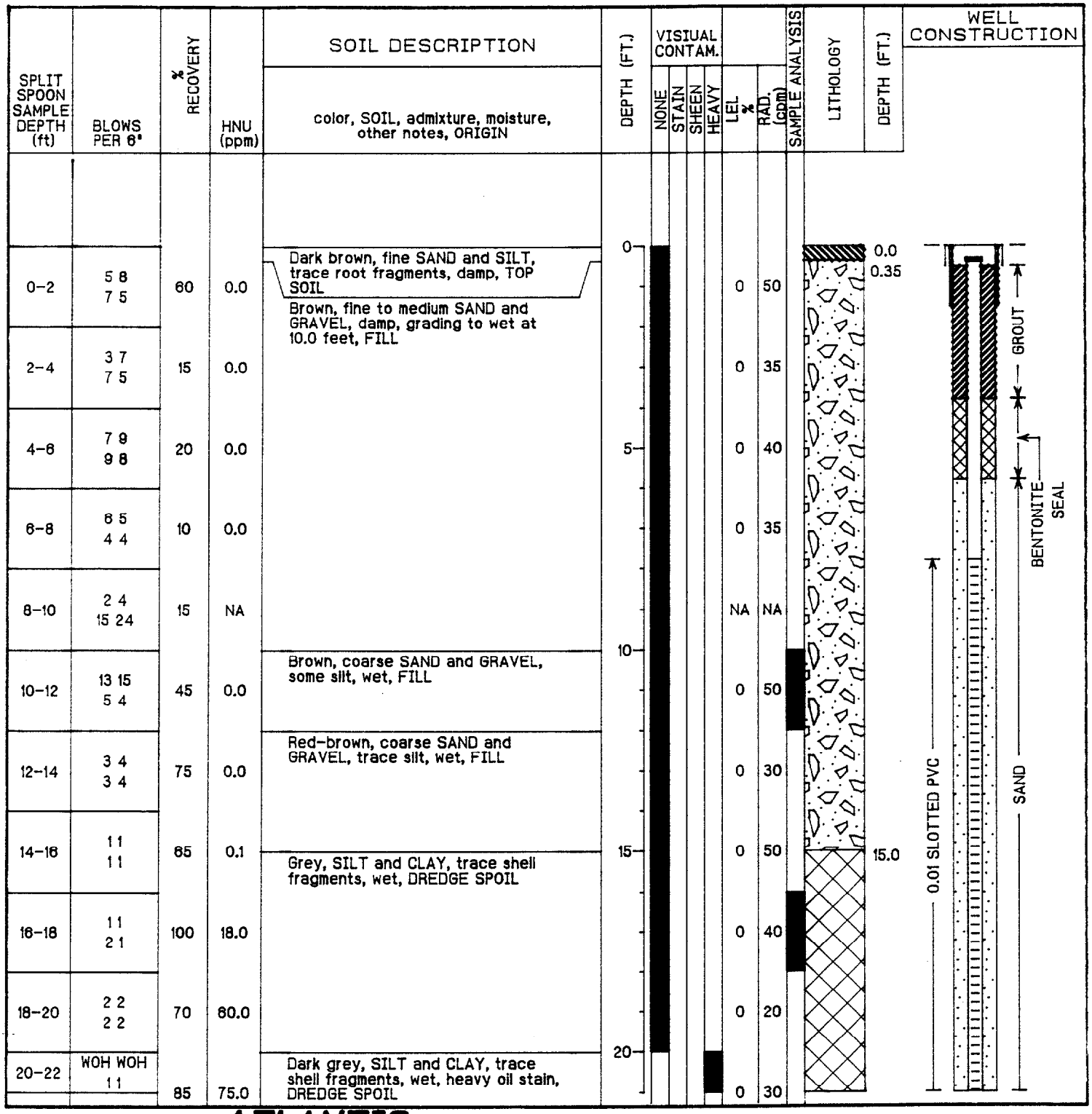
ATLANTIC

BORING LOG 2W MW 3S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 08/22/90
DATA COMPLETED: 08/22/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.8
PROTECTIVE CASING ELEVATION: 84.50
WELL ELEVATION: 84.37
WATER LEVEL: 73.78 (03/21/91)
DATUM: SUBASE
WEATHER: 60°, LIGHT RAIN
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 8 7 5	60	0.0	Dark brown, fine SAND and SILT, trace root fragments, damp, TOP SOIL
2-4	3 7 7 5	15	0.0	Brown, fine to medium SAND and GRAVEL, damp, grading to wet at 10.0 feet, FILL
4-6	7 9 9 8	20	0.0	
6-8	6 5 4 4	10	0.0	
8-10	2 4 15 24	15	NA	
10-12	13 15 5 4	45	0.0	Brown, coarse SAND and GRAVEL, some silt, wet, FILL
12-14	3 4 3 4	75	0.0	Red-brown, coarse SAND and GRAVEL, trace silt, wet, FILL
14-16	1 1 1 1	65	0.1	Grey, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL
16-18	1 1 2 1	100	18.0	
18-20	2 2 2 2	70	60.0	
20-22	WOH WOH 1 1	85	75.0	Dark grey, SILT and CLAY, trace shell fragments, wet, heavy oil stain, DREDGE SPOIL



BORING LOG 2W MW 3S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 08/22/90
DATA COMPLETED: 08/22/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.8
PROTECTIVE CASING ELEVATION: 84.50
WELL ELEVATION: 84.37
WATER LEVEL: 73.78 (03/21/91)
DATUM: SUBASE
WEATHER: 60°, LIGHT RAIN
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21				■					22.0	0.01 SLOTTED PVC
20-22	WOH WOH 1 1			AUGER TO 25.0 feet										25.0	
25-27	WOH WOH 1 1	100	12.0	Dark brown, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL	26	■				19	40			27.0	
				AUGER TO 30.0 feet										30.0	
30-32	WOH WOH 1 1	100	35.0	Dark brown, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL	31	■				0	40			32.0	
				AUGER TO 35.0 feet										35.0	
35-37	1 1 6 7	100	1.0	Red-brown, fine SAND and SILT, trace roots, wet, TOP SOIL	36	■				0	30			37.0	
				AUGER TO 40.0 feet										40.0	SAND
40-42	19 17 11 100/3	10	0.7	Brown, fine SAND and SILT, trace gravel, wet,	41	■				0	40			41.5	
				AUGER REFUSAL AT 41.5 feet											

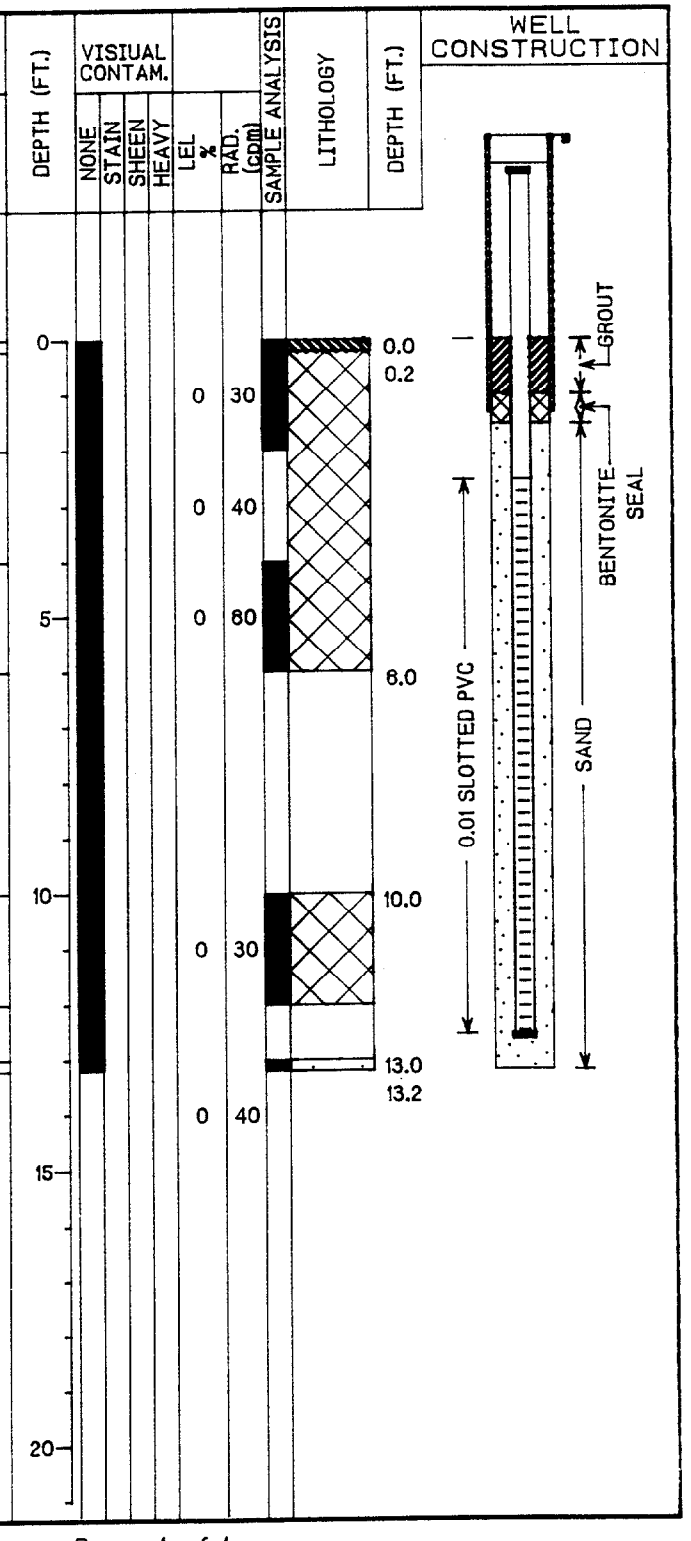
ATLANTIC

BORING LOG 2W MW 5S

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 9/4/90
DATA COMPLETED: 9/4/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 73.5
PROTECTIVE CASING ELEVATION: 77.18
WELL ELEVATION: 76.48
WATER LEVEL: 73.80 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN
0–2	2 2 2 2	100	0.6	Dark brown, organic SILT, trace roots, damp, TOP SOIL. Gray brown, SILT and CLAY, trace fine Sand, mottled, moist, DREDGE SPOIL
2–4	3 2 3 2	100	0.6	Grading to trace shell fragments
4–6	1 2 1 2	100	0.6	Grading to wet.
				AUGER TO 10.0 feet
10–12	1 1 2 11	30	0.6	Gray brown, SILT and CLAY, trace fine Sand, mottled, wet, DREDGE SPOIL
				AUGER TO 13.0 feet
13–13.2	100/2"	100	0.6	Gray, fine to coarse SAND, little fine Gravel, little Silt, wet. END OF BORING AT 13.2 feet



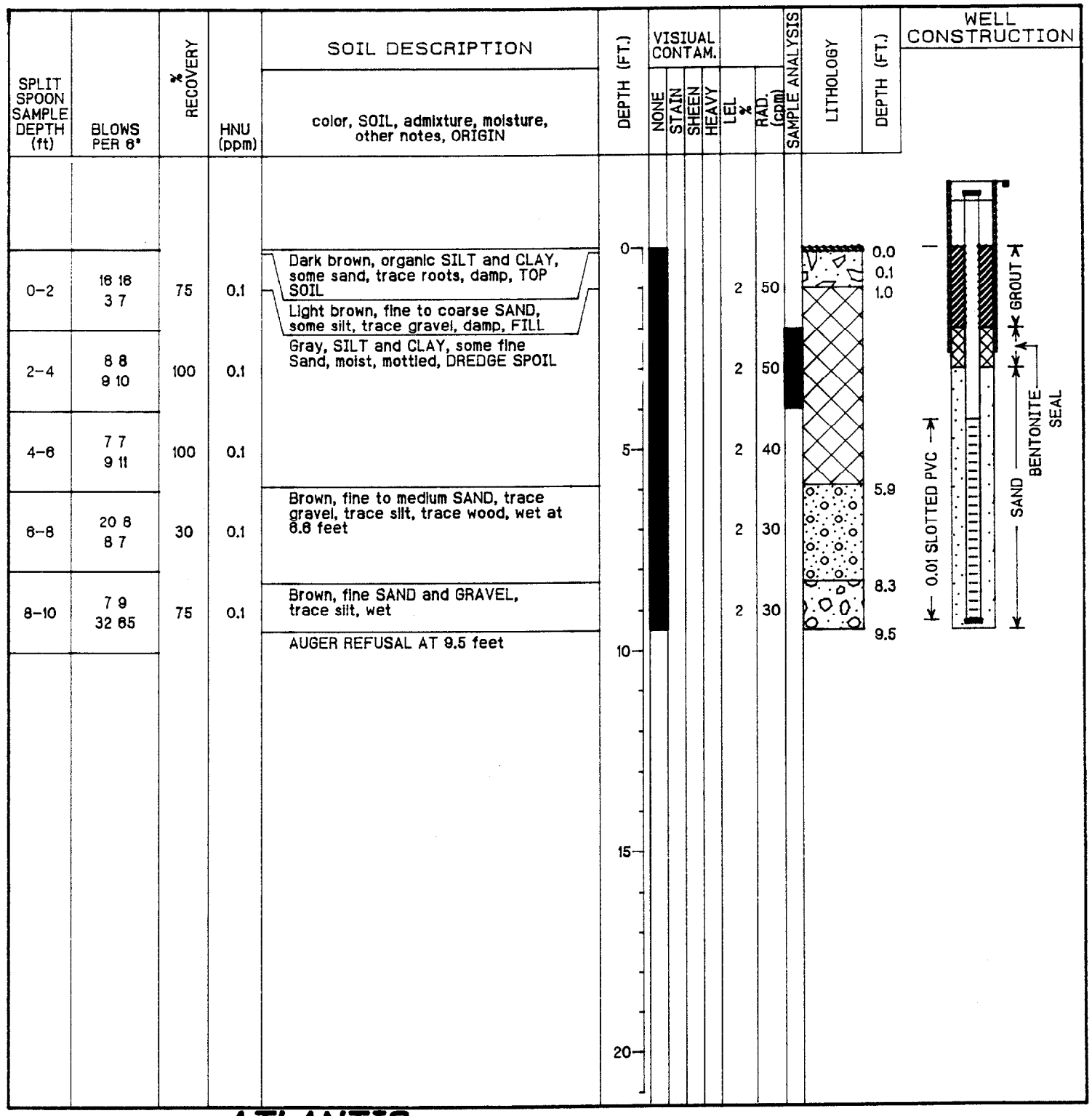
ATLANTIC

BORING LOG 2W MW 6S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A WETLAND
DATE STARTED: 10/03/90
DATA COMPLETED: 10/03/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 83.4
PROTECTIVE CASING ELEVATION: 85.03
WELL ELEVATION: 84.67
WATER LEVEL: 77.04 (03/21/91)
DATUM: SUBASE
WEATHER: 70°, CLEAR SKIES
INSPECTOR: ANNA SULLIVAN AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	16 16 3 7	75	0.1	Dark brown, organic SILT and CLAY, some sand, trace roots, damp, TOP SOIL
				Light brown, fine to coarse SAND, some silt, trace gravel, damp, FILL
2-4	8 8 9 10	100	0.1	Gray, SILT and CLAY, some fine Sand, moist, mottled, DREDGE SPOIL
4-6	7 7 9 11	100	0.1	
6-8	20 8 8 7	30	0.1	Brown, fine to medium SAND, trace gravel, trace silt, trace wood, wet at 6.6 feet
8-10	7 9 32 65	75	0.1	Brown, fine SAND and GRAVEL, trace silt, wet
				AUGER REFUSAL AT 9.5 feet



ATLANTIC

BORING LOG 2L TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: AREA A LANDFILL
DATE STARTED: 9/25/90
DATA COMPLETED: 9/25/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 84.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	3 2 4 6	50	0.2	Brown, fine to medium SAND, trace silt, trace gravel, trace asphalt, damp, FILL						1	30				
2-4	14 19 9 10	50	0.2							1	30			4.0	
4-6	7 6 8 9	0	NA	NO RECOVERY	5					NA	NA				
6-8	4 6 7 9	10	0.2	Brown, fine to medium SAND, trace silt, trace gravel, trace plastic, moist, FILL						1	40			6.0	
8-10	4 4 4 3	1	0.2	Brown, fine to medium SAND, some silt, wet, FILL						1	40				
10-12	2 2 2 2	0	NA	NO RECOVERY	10					NA	NA			10.0	
12-14	3 3 4 3	100	0.2	Grey, SILT and CLAY, trace fine sand, trace shell fragments, trace wood fragments, wet, DREDGE SPOIL						1	30			12.0	
14-16	2 2 2 4	100	0.2		15					1	30				
16-18	2 2 1 1	0	NA	NO RECOVERY						NA	NA			16.0	
18-20	2 2 2 2	10	1.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments, trace wood fragments, wet, DREDGE SPOIL						1	40			18.0	
				AUGER REFUSAL AT 20.0 feet	20									20.0	

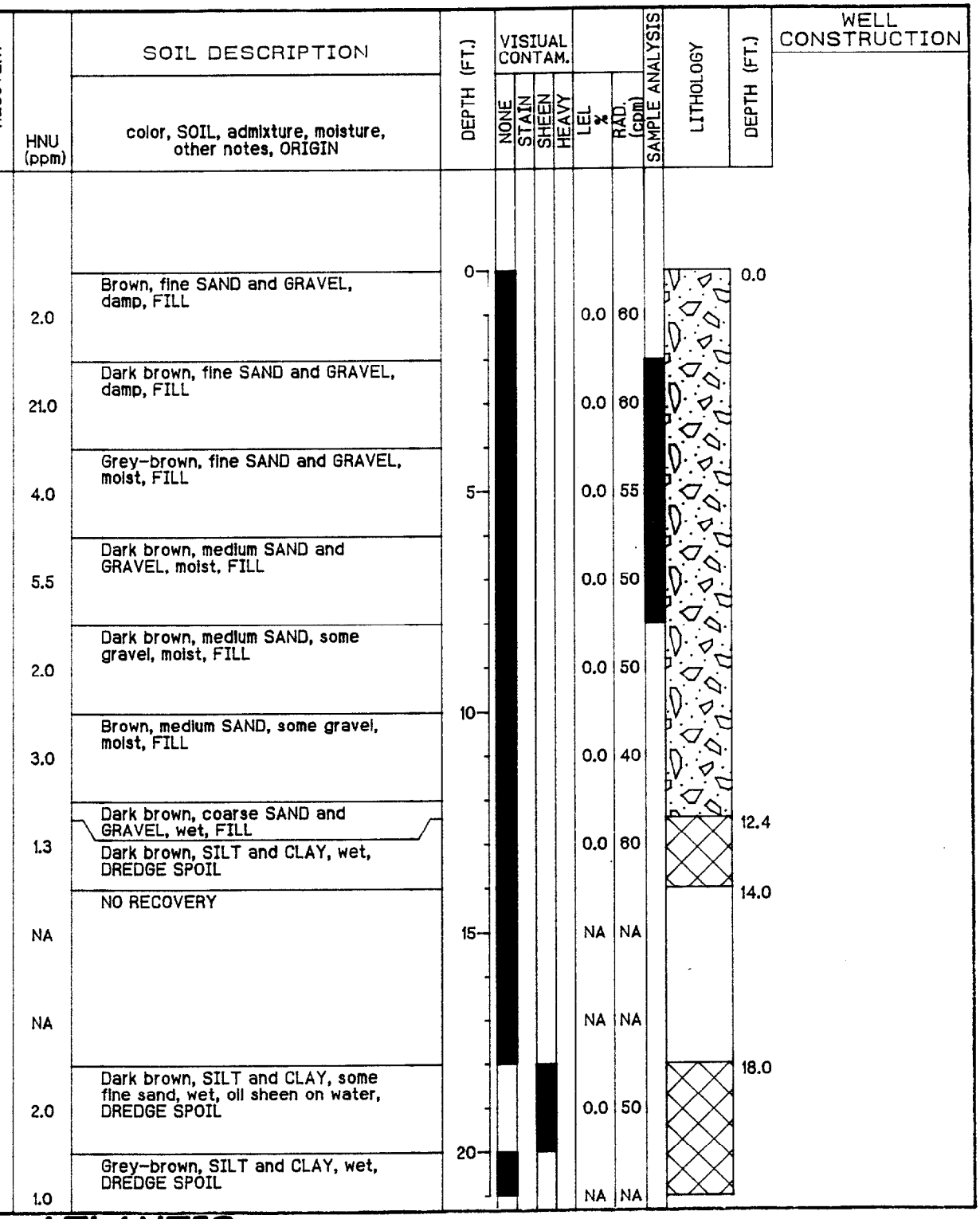
ATLANTIC

BORING LOG 2L TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/16/90
DATA COMPLETED: 08/16/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 84.6
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, CLEAR SKIES
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 16 16 17	55	2.0	Brown, fine SAND and GRAVEL, damp, FILL
2-4	26 14 8 5	45	21.0	Dark brown, fine SAND and GRAVEL, damp, FILL
4-6	16 7 6 5	60	4.0	Grey-brown, fine SAND and GRAVEL, moist, FILL
6-8	11 8 7 9	35	5.5	Dark brown, medium SAND and GRAVEL, moist, FILL
8-10	11 5 6 9	10	2.0	Dark brown, medium SAND, some gravel, moist, FILL
10-12	7 2 1 2	10	3.0	Brown, medium SAND, some gravel, moist, FILL
12-14	1 1 1 1	95	1.3	Dark brown, coarse SAND and GRAVEL, wet, FILL Dark brown, SILT and CLAY, wet, DREDGE SPOIL
14-16	1 1 1 1	0	NA	NO RECOVERY
16-18	NA	0	NA	
18-20	1 1 1 1	5	2.0	Dark brown, SILT and CLAY, some fine sand, wet, oil sheen on water, DREDGE SPOIL
20-22	1 1 1 1	45	1.0	Grey-brown, SILT and CLAY, wet, DREDGE SPOIL



ATLANTIC

BORING LOG 2L TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/16/90
DATA COMPLETED: 08/16/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 84.6
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLEAR SKIES
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21										
20-22	11 11														
22-24	1 16 49 100/2	90	0.0	Brown, fine to coarse SAND and GRAVEL, wet						0.0	60			22.0	
				AUGER REFUSAL AT 24.0 feet										24.0	
					26										
					31										
					36										
					41										

BORING LOG 2L TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 9/25/90
DATA COMPLETED: 9/25/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 84.6
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	4 7 9 7	80	0.4	Brown, fine to medium SAND, some gravel, trace silt, damp, FILL Dark brown staining at 1.5 to 1.8 feet.
2-4	3 5 5 8	30	0.4	Brown, fine to medium SAND, some gravel, trace silt, damp, FILL
4-6	4 4 5 9	10	0.4	Brown, fine to medium SAND, some gravel, trace silt, damp, FILL
6-8	4 3 5 7	5	0.4	Small piece of wood in shoe of spoon.
8-10	4 5 2 1	5	0.4	Small flakes of rusted metal, wet at 10.0 feet, FILL
10-12	1 2 1 2	0	NA	NO RECOVERY
12-14	1 1 1 1	75	1.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL
14-16	AUGER	NA	NA	AUGER TO 18.0 feet
16-18	AUGER	NA	NA	
18-20	100/1	NA	NA	REFUSAL AT 18.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	40	
					1	50	
5					1	30	
					1	30	
					1	30	
10					NA	NA	
					1	40	
15					NA	NA	
					NA	NA	
20					NA	NA	

LITHOLOGY

DEPTH (FT.)	WELL CONSTRUCTION
0.0	
10.0	
12.0	
14.0	
18.0	

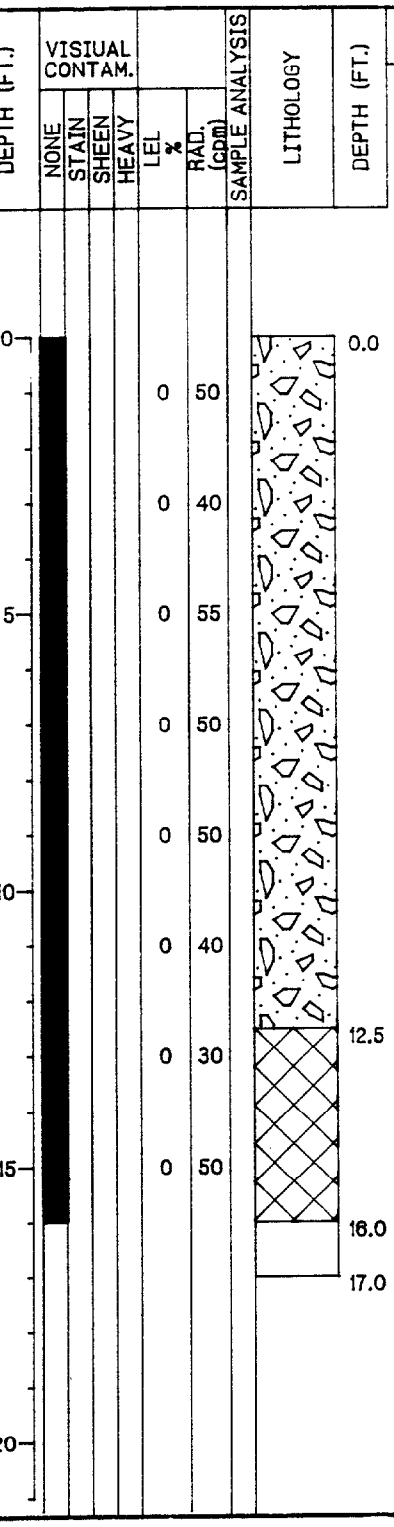
ATLANTIC

BORING LOG 2L TB 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 9/20/90
DATA COMPLETED: 9/20/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 88.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, PARTLY CLOUDY
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	19 17 100/2	50	0.4	Brown, medium SAND and GRAVEL, damp, FILL Brown, medium SAND and GRAVEL, blue ash, wood fragments, red brick fragments, damp, FILL
2-4	6 12 33 10	70	0.4	
4-6	7 6 11 4	40	0.7	Brown to blue, fine SAND and ASH, concrete, damp, FILL
6-8	7 11 4 4	35	0.7	Dark brown, medium to coarse, SAND and ASH, wood, concrete fragments, wet at 8.0 feet, FILL
8-10	13 7 7 6	25	0.9	Dark brown, fine to medium SAND and ASH, wet, FILL
10-12	7 5 5 6	10	0.4	
12-14	1 1 1 1	50	0.4	Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet, DREDGE SPOIL
14-16	1 1 1 1	60	0.4	
				AUGER REFUSAL AT 17.0 feet End of boring at 17.0.



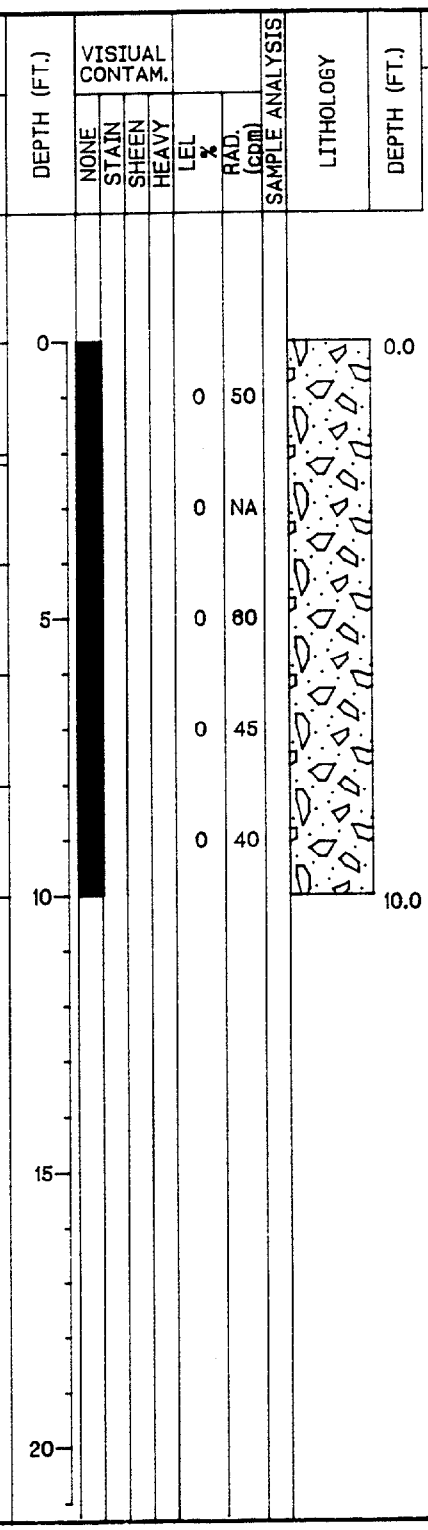
ATLANTIC

BORING LOG 2L TB 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 9/21/90
DATA COMPLETED: 9/24/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 88.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 60°, CLEAR SKIES
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	7 55 22 17	70	0.7	Light brown, medium SAND and GRAVEL, some ash, asphalt, damp, FILL
				ASPHALT
2-4	10 32 100/5	10	1.0	Dark brown, fine to medium SAND, some wood fragments, damp, FILL
4-6	7 3 1 1	30	0.4	Dark brown, fine to medium SAND, some wood fragments, damp, FILL
6-8	6 38 7 4	30	1.0	Dark brown, fine to medium SAND and GRAVEL, wet at 8.0 feet, FILL
8-10	10 13 4 6	80	1.6	Dark brown, fine SAND and GRAVEL, wet, FILL
				AUGER REFUSAL AT 10.0 feet



ATLANTIC

BORING LOG 2L TB 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/08/90
DATA COMPLETED: 08/08/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 88.4
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, LIGHT RAIN
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	15 20 22 29	65	0.4	Brown, fine to medium SAND and GRAVEL, trace glass, trace brick fragments, damp, FILL						0	37.5				
2-4	NA	60	0.4	Brown, fine to coarse SAND and GRAVEL, damp, FILL						0	40				
				AUGER TO 5.0 feet										4.0	
5-7	14 19 20 30	60	0.4	Brown, fine SAND and SILT, trace gravel, trace ash, moist, FILL	5					0	60			5.0	
7-9	3 4 4 5	0	NA	NO RECOVERY						NA	NA			7.0	
9-11	3 2 2 3	25	0.4	Brown, fine to coarse SAND, moist, FILL						0	40			8.0	
11-13	2 3 3 4	35	NA	Brown, fine to coarse SAND, some silt, wet, FILL	10					0	50				
13-15	2 1 1 2	80	NA	Brown, SILT and CLAY, trace fine sand, wet, DREDGE SPOIL						0	40			13.0	
15-17	4 4 3 11	100	NA	Grey-brown, SILT and CLAY, trace fine sand, wet, DREDGE SPOIL	15					0	40				
17-19	11 25 30 32	100	NA							0	30			19.0	
19-21	32 35 55 100/3	90	NA	Brown, coarse SAND and GRAVEL, wet	20					0	40				
				AUGER REFUSAL AT 21.0 feet										21.0	

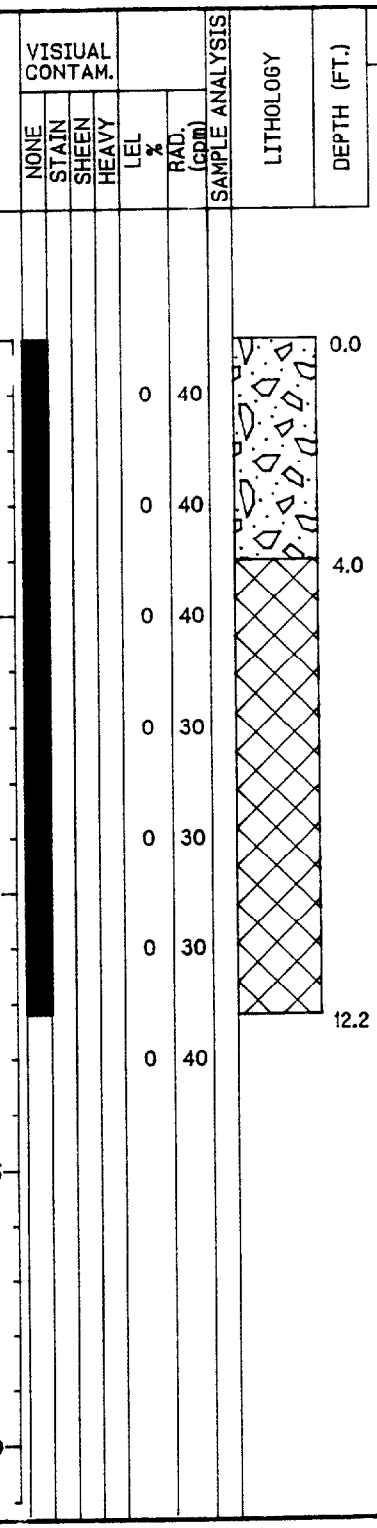
ATLANTIC

BORING LOG 2L TB 7

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/07/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 87.4
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, CLOUDY WITH SHOWERS
INSPECTOR: ERIK NESS AND FRANCIS DUMONT
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	9 9 9 28	10	0.0	Grey, coarse SAND and GRAVEL, damp, FILL
2-4	4 6 7 4	10	0.0	Brown fine SAND, some gravel, trace cardboard, damp, FILL
4-6	4 8 3 2	30	0.0	Grey, SILT and CLAY, trace sand, trace gravel, damp, DREDGE SPOIL
6-8	4 8 8 8	10	0.0	Grey, fine SAND and SILT, trace gravel, damp, DREDGE SPOIL
8-10	4 11 9 9	40	0.0	
10-12	38 14 14 40	30	0.0	Grey, fine SAND and SILT, moist, DREDGE SPOIL
12-14	100/3	30	0.0	AUGER REFUSAL AT 12.2 feet



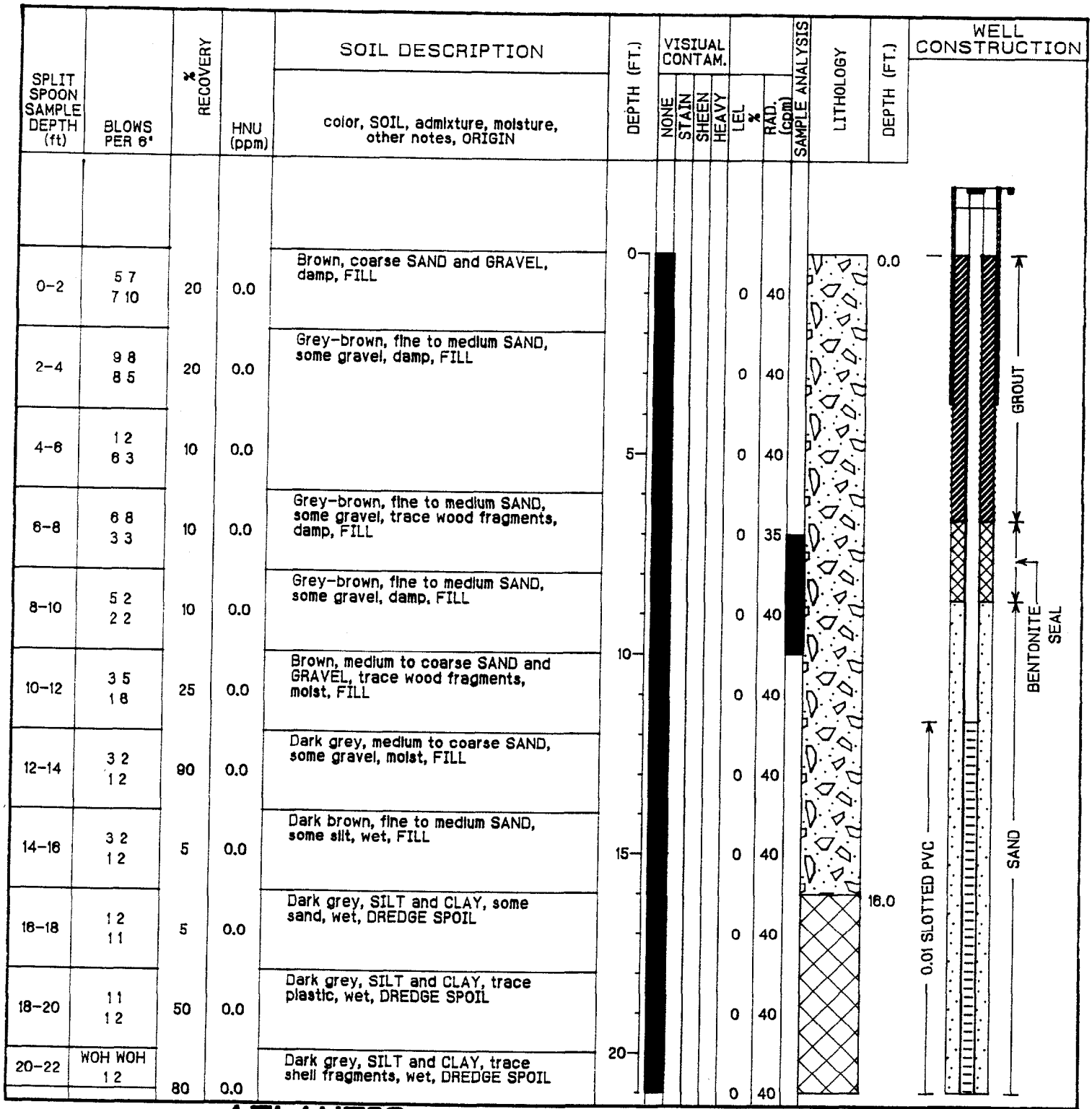
ATLANTIC

BORING LOG 2L MW 7S

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1258-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/07/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.8
PROTECTIVE CASING ELEVATION: 84.50
WELL ELEVATION: 84.37
WATER LEVEL: 74.47 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, LIGHT RAIN
INSPECTOR: ERIK NESS AND FRANCIS DUMONT
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 7 7 10	20	0.0	Brown, coarse SAND and GRAVEL, damp, FILL
2-4	9 8 8 5	20	0.0	Grey-brown, fine to medium SAND, some gravel, damp, FILL
4-6	1 2 6 3	10	0.0	
6-8	6 8 3 3	10	0.0	Grey-brown, fine to medium SAND, some gravel, trace wood fragments, damp, FILL
8-10	5 2 2 2	10	0.0	Grey-brown, fine to medium SAND, some gravel, damp, FILL
10-12	3 5 1 8	25	0.0	Brown, medium to coarse SAND and GRAVEL, trace wood fragments, moist, FILL
12-14	3 2 1 2	90	0.0	Dark grey, medium to coarse SAND, some gravel, moist, FILL
14-16	3 2 1 2	5	0.0	Dark brown, fine to medium SAND, some silt, wet, FILL
16-18	1 2 1 1	5	0.0	Dark grey, SILT and CLAY, some sand, wet, DREDGE SPOIL
18-20	1 1 1 2	50	0.0	Dark grey, SILT and CLAY, trace plastic, wet, DREDGE SPOIL
20-22	WOH WOH 1 2	80	0.0	Dark grey, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL



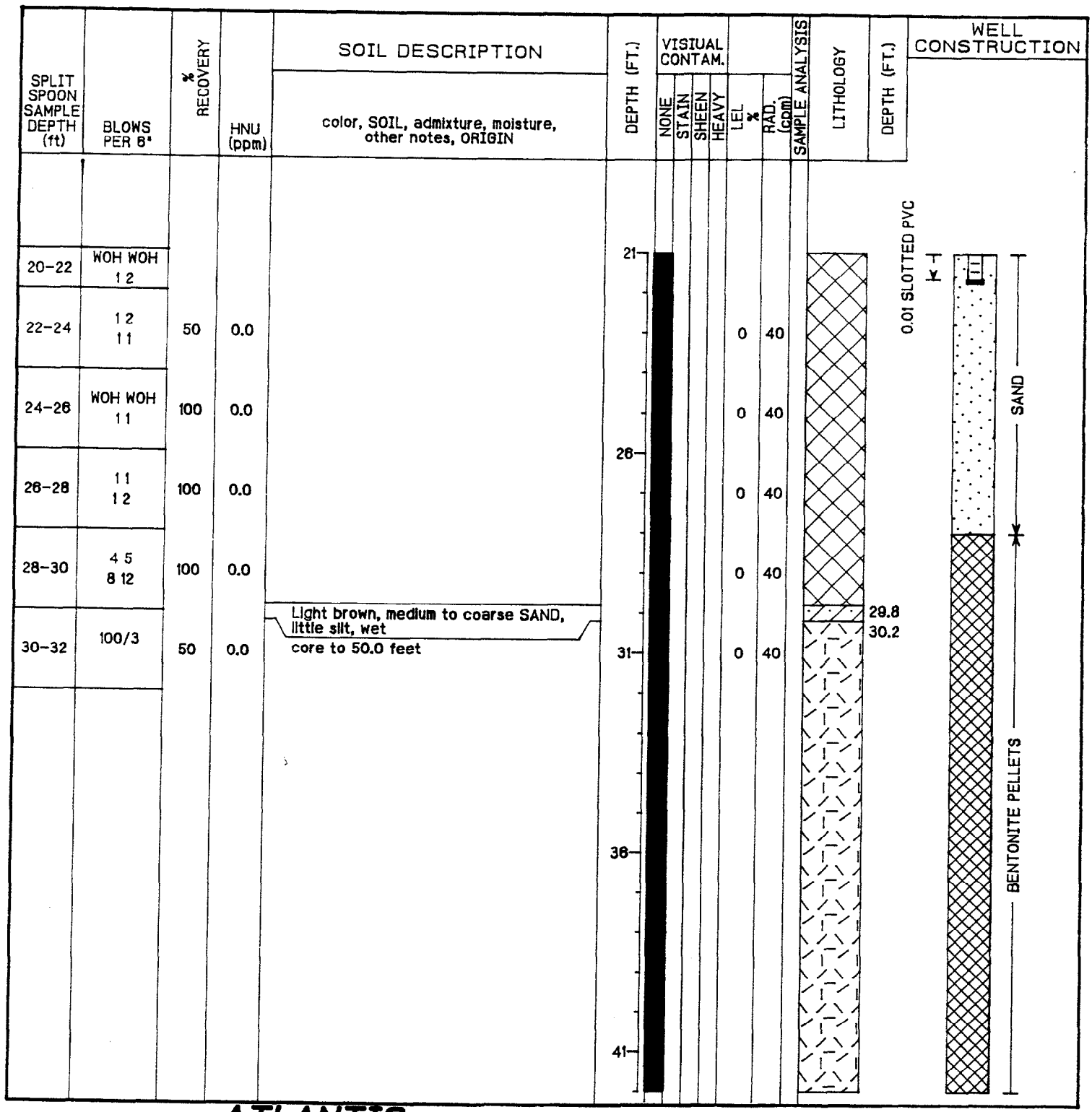
ATLANTIC

BORING LOG 2L MW 7S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/07/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.8
PROTECTIVE CASING ELEVATION: 84.50
WELL ELEVATION: 84.37
WATER LEVEL: 74.47 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, LIGHT RAIN
INSPECTOR: ERIK NESS AND FRANCIS DUMONT
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
20-22	WOH WOH 1 2			
22-24	1 2 1 1	50	0.0	
24-26	WOH WOH 1 1	100	0.0	
26-28	1 1 1 2	100	0.0	
28-30	4 5 8 12	100	0.0	
30-32	100/3	50	0.0	Light brown, medium to coarse SAND, little silt, wet core to 50.0 feet

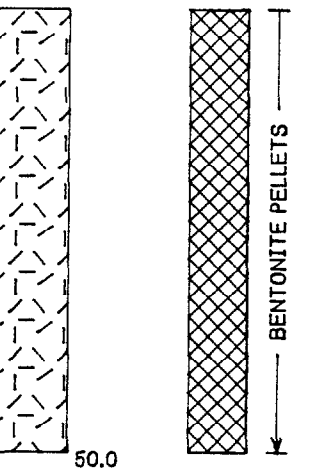


BORING LOG 2L MW 7S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/07/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.8
PROTECTIVE CASING ELEVATION: 84.50
WELL ELEVATION: 84.37
WATER LEVEL: 74.47 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, LIGHT RAIN
INSPECTOR: ERIK NESS AND FRANCIS DUMONT
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM.: NONE / STAIN / SHEEN / HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					42							
					47							
					52						50.0	
					57							
					62							



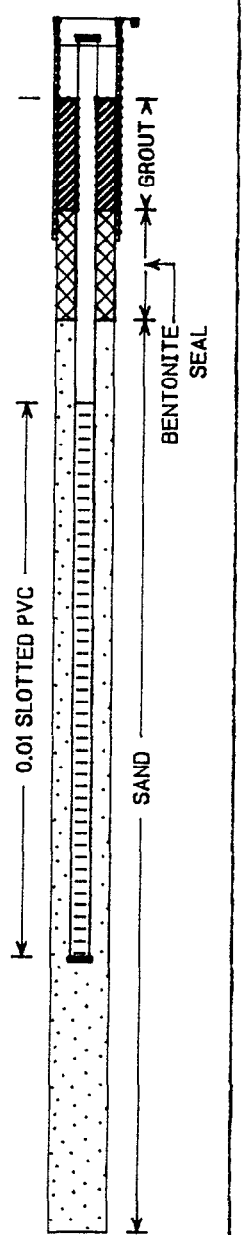
BORING LOG 2L MW 8S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/02/90
DATA COMPLETED: 08/03/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 86.40
PROTECTIVE CASING ELEVATION: 87.85
WELL ELEVATION: 87.45
WATER LEVEL: 88.74 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, MOSTLY SUNNY
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
0-2	3 2 45 14	30	NA	Brown, fine SAND, some gravel, damp, FILL	0					0	60			0.0
2-4	2 1 1 2	10	NA							0	40			
4-6	7 6 8 4	40	NA	Dark brown, fine to medium SAND, trace brick fragments, trace paper, damp, FILL	5					0	40			
6-8	3 5 7 7	70	NA	Dark brown, coarse SAND, some gravel, trace paper, oil sheen, wet, FILL						0	40			
8-10	6 5 5 6	65	NA	Dark grey, SILT and CLAY, trace wood, oil stain, wet, FILL						0	30			
10-12	5 5 6 7	75	NA	Red-brown, fine SAND and SILT, trace gravel, wet	10					0	30			10.0
12-14	10 20 22 24	65	NA	Brown, fine SAND and SILT, trace gravel, wet						0	40			
14-16	15 18 22 29	40	NA	Brown, SAND and GRAVEL, some silt, wet	15					0	40			14.0
16-18	24 38 63 80	100	NA	Brown, coarse SAND and SILT, wet						0	50			16.0
18-20	90 100/2	50	NA	Brown, coarse SAND and GRAVEL, wet						0	30			18.0
				AUGER REFUSAL AT 20.5 feet	20									20.0

WELL CONSTRUCTION



ATLANTIC

BORING LOG 2L MW 9S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/16/90
DATA COMPLETED: 08/17/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 85.3
PROTECTIVE CASING ELEVATION: 88.15
WELL ELEVATION: 86.96
WATER LEVEL: 77.96 (03/21/91)
DATUM: SUBASE
WEATHER: 95°, CLEAR SKIES, VERY HUMID
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 7 9 9	85	0.0	Brown, fine to medium SAND and GRAVEL, damp, FILL
2-4	9 7 5 7	40	6.5	Dark brown, fine SAND and GRAVEL, trace clay, damp, FILL
4-6	7 6 5 9	20	3.0	Brown, medium SAND and GRAVEL, moist, FILL
6-8	5 4 4 4	35	2.8	Brown, medium to coarse SAND and GRAVEL, trace wood fragments, moist, FILL
8-10	6 9 11 18	35	0.0	Brown, fine to medium SAND and GRAVEL, trace paper, trace glass, wet, FILL
10-12	6 7 11	30	0.0	WOOD
12-14	11 11	75	0.0	Dark grey, coarse SAND and SILT, some clay, trace wood fragments, wet, DREDGE SPOIL
14-16	11 12	100	0.0	Grey, SILT and CLAY, trace fine sand, trace shell fragments, trace wood fragments, wet, DREDGE SPOIL
16-18	21 12	100	NA	
18-20	21 22	90	0.0	
20-22	WOH WOH WOH WOH	100	0.0	

DEPTH (FT.): 0, 5, 10, 15, 20

VISUAL CONTAM.: NONE, STAIN, SHEEN, HEAVY

LEL %	RAD. (cpm)
0	40
0	50
0	80
0	60
0	80
0	60
0	60
0	50
NA	NA
0	50
0	45

SAMPLE ANALYSIS

LITHOLOGY

DEPTH (FT.): 0.0, 12.0

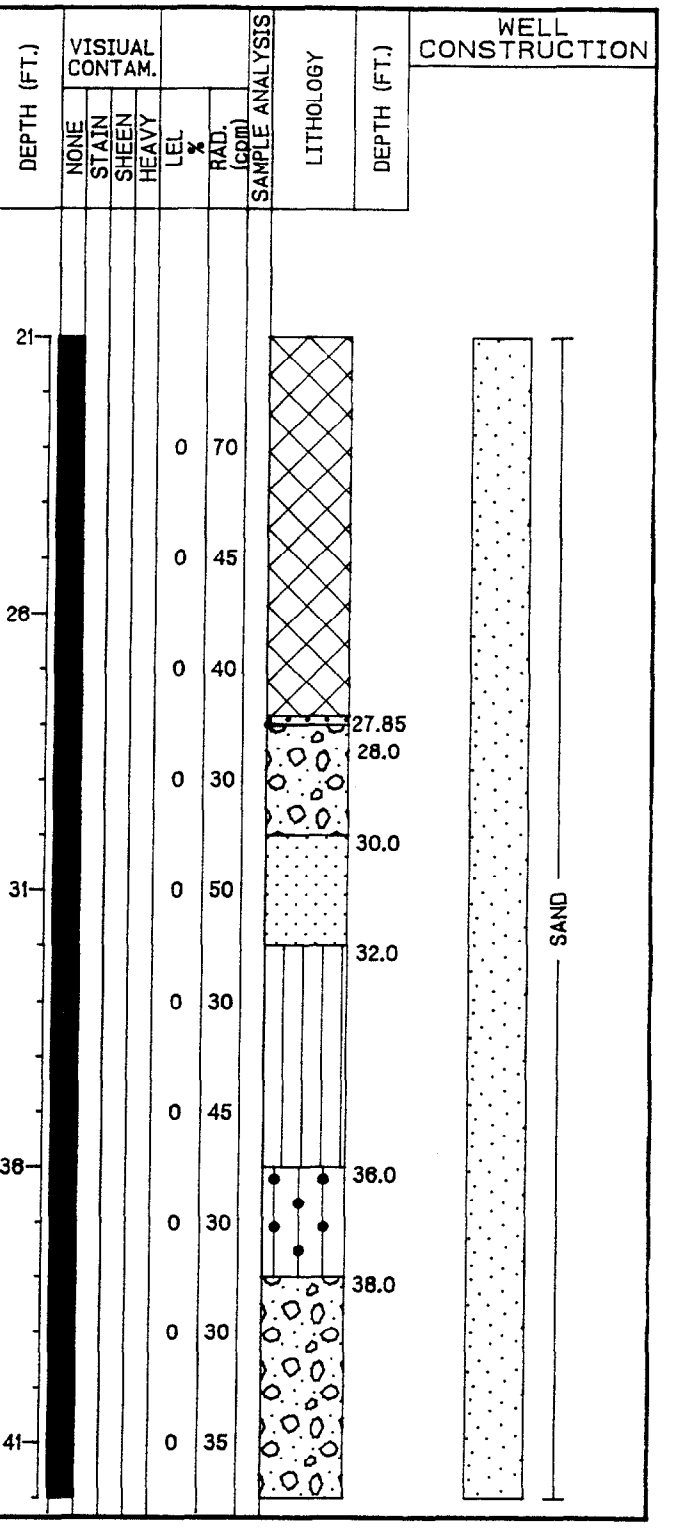
WELL CONSTRUCTION: GROUT, BENTONITE SEAL, 0.01 SLOTTED PVC, SAND

BORING LOG 2L MW 9S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/16/90
DATA COMPLETED: 08/17/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 85.3
PROTECTIVE CASING ELEVATION: 88.15
WELL ELEVATION: 86.96
WATER LEVEL: 77.96 (03/21/91)
DATUM: SUBASE
WEATHER: 95°, CLEAR SKIES, VERY HUMID
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
20-22	WOH WOH WOH WOH			
22-24	WOH WOH 1 2	100	0.0	
24-26	1 2 1 2	100	0.0	
26-28	NA	100	0.0	
28-30	NA	100	0.0	Brown, medium SAND, trace gravel, wet Brown, medium SAND and GRAVEL, wet
30-32	NA	60	0.0	Brown, fine SAND, some gravel, wet
32-34	NA	60	0.0	Brown, SILT, some gravel, wet
34-36	NA	85	0.0	
36-38	13 6 5 6	85	0.0	Grey-brown, SILT and CLAY, trace fine sand, trace gravel, trace wood, wet
38-40	4 16 12 14	20	0.0	Brown, fine SAND and GRAVEL, wet
40-42	6 9 4 5	45	0.0	



BORING LOG 2L MW 9S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/16/90
DATA COMPLETED: 08/17/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 85.3
PROTECTIVE CASING ELEVATION: 88.15
WELL ELEVATION: 86.96
WATER LEVEL: 77.96 (03/21/91)
DATUM: SUBASE
WEATHER: 95°, CLEAR SKIES, VERY HUMID
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM.: NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					42										SAND
42-44	100/3	10	0.0	AUGER REFUSAL AT 42.5 feet						0	60			42.5	
					47										
					52										
					57										
					62										

ATLANTIC

BORING LOG 2L MW 13S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/22/90
DATA COMPLETED: 08/22/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 88.9
PROTECTIVE CASING ELEVATION: 88.80
WELL ELEVATION: 88.53
WATER LEVEL: 75.09 (03/21/91)
DATUM: SUBASE
WEATHER: 65°, CLEAR SKIES, LIGHT WIND
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

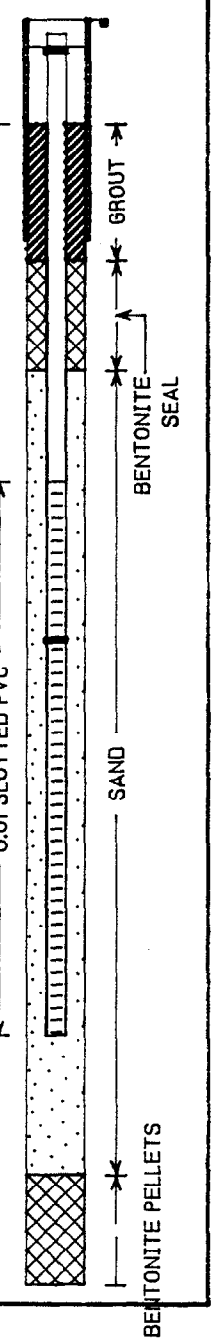
SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	5 8 7 9	35	0.4	Brown, medium to coarse SAND and GRAVEL, damp, FILL
2-4	22 24 22 26	100	0.0	Dark brown, SILT, some gravel, red staining, grading to moist at 6.0 feet, FILL
4-6	24 21 17 18	100	0.0	
6-8	12 11 9 8	100	0.0	
8-10	10 11 25 28	100	NA	Grading to red, medium SAND and GRAVEL, trace silt, trace plastic, wet, FILL
10-12	8 7 6 4	15	0.0	Grey-brown, SILT, trace gravel, wet, FILL
12-14	8 9 10 12	10	0.0	Brown, fine SAND and SILT, trace black ash, wet, FILL
14-16	3 8 27 100/1	60	0.0	Brown, SILT, some gravel, some ash, wet, FILL
				AUGER REFUSAL AT 16.0 feet CORE from 16.0 - 36.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					0	40	
					0	35	
5					0	50	
					0	60	
					NA	NA	
10					0	30	
					0	30	
15					0	40	
20							

LITHOLOGY

DEPTH (FT.): 0.0, 16.0

WELL CONSTRUCTION



ATLANTIC

BORING LOG 2L MW 13S

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/22/90
DATA COMPLETED: 08/22/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 86.9
PROTECTIVE CASING ELEVATION: 88.80
WELL ELEVATION: 88.53
WATER LEVEL: 75.09 (03/21/91)
DATUM: SUBASE
WEATHER: 65°, CLEAR SKIES, LIGHT WIND
INSPECTOR: MICHAEL NEJDL AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM.: NONE / STAIN / SHEEN / HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					21							
					26							
					31							
					36						36.0	BENTONITE PELLETS
					41							

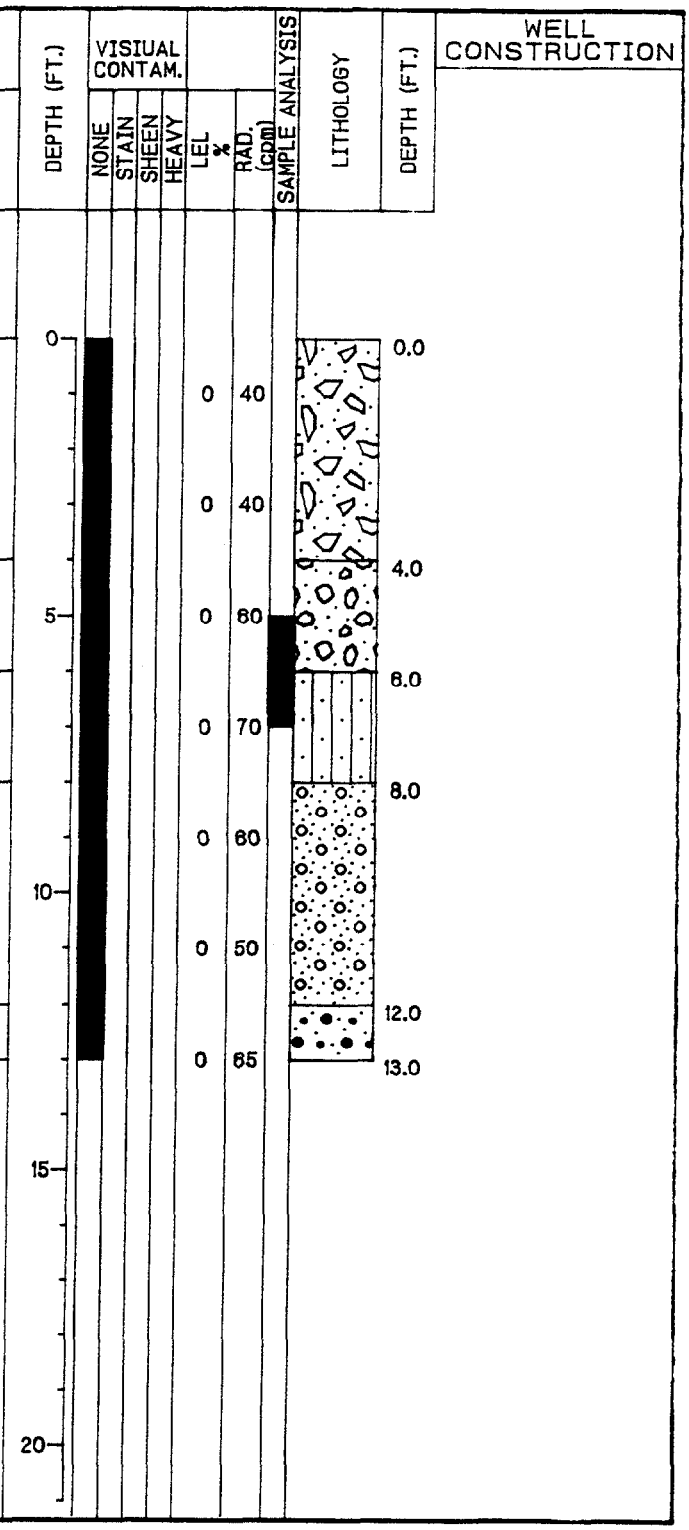
ATLANTIC

BORING LOG 2L MW 14S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 07/31/90
DATA COMPLETED: 07/31/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 91.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 85°, CLEAR SKIES
INSPECTOR: MIKE NEJDL
CHECKED BY: CURT KRAEMER

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	9 16 26 28	70	0.0	Brown, fine to coarse SAND, trace silt, some gravel, damp, FILL
2-4	15 8 4 8	7	0.0	
4-6	9 6 4 7	10	0.0	Brown, fine to coarse SAND and GRAVEL, trace silt, damp
6-8	6 5 4 3	100	0.0	Brown, fine SAND and SILT, trace wood fragments, damp
8-10	5 8 12 14	85	0.0	Brown, fine to medium SAND, little gravel, trace silt, damp
10-12	11 40 50/5	60	0.0	
12-14	17 100	40	0.0	Brown fine to coarse SAND, little gravel, trace silt, moist AUGER REFUSAL AT 13.0 feet, NO WELL INSTALLED, only indication of moisture was in bottom six inches of boring.



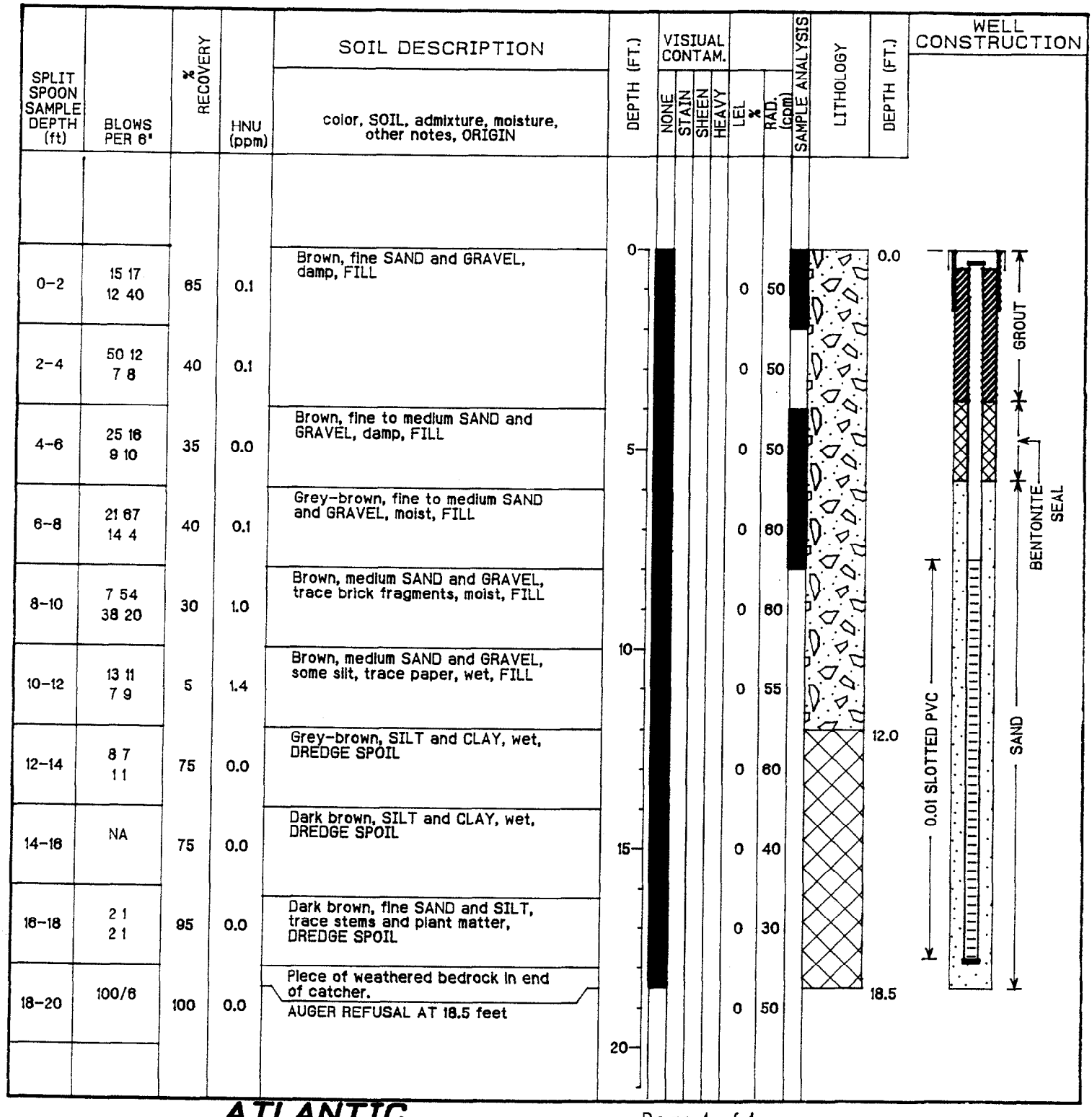
ATLANTIC

BORING LOG 2L MW 17S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/15/90
DATA COMPLETED: 08/15/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 82.48
PROTECTIVE CASING ELEVATION: 82.48
WELL ELEVATION: 82.12
WATER LEVEL: 76.23 (03/21/91)
DATUM: SUBASE
WEATHER: 80°, MOSTLY SUNNY, HUMID
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	15 17 12 40	65	0.1	Brown, fine SAND and GRAVEL, damp, FILL
2-4	50 12 7 8	40	0.1	
4-6	25 16 9 10	35	0.0	Brown, fine to medium SAND and GRAVEL, damp, FILL
6-8	21 67 14 4	40	0.1	Grey-brown, fine to medium SAND and GRAVEL, moist, FILL
8-10	7 54 38 20	30	1.0	Brown, medium SAND and GRAVEL, trace brick fragments, moist, FILL
10-12	13 11 7 9	5	1.4	Brown, medium SAND and GRAVEL, some silt, trace paper, wet, FILL
12-14	8 7 11	75	0.0	Grey-brown, SILT and CLAY, wet, DREDGE SPOIL
14-16	NA	75	0.0	Dark brown, SILT and CLAY, wet, DREDGE SPOIL
16-18	2 1 2 1	95	0.0	Dark brown, fine SAND and SILT, trace stems and plant matter, DREDGE SPOIL
18-20	100/6	100	0.0	Piece of weathered bedrock in end of catcher. AUGER REFUSAL AT 18.5 feet



ATLANTIC

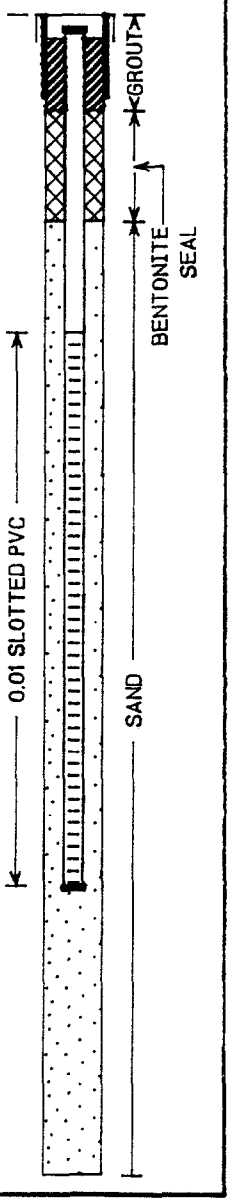
BORING LOG 2L MW 18S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/03/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 77.94
PROTECTIVE CASING ELEVATION: 77.94
WELL ELEVATION: 77.60
WATER LEVEL: 71.55 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, OVERCAST
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
0-2	22 30 29 19	50	6.1	Brown, medium SAND and GRAVEL, damp, FILL	0					0	120			0.0
2-4	22 45 26 12	35	0.8	Grey, medium SAND, some ash, trace wood fragments, damp, FILL						0	120			
4-6	8 7 5 5	30	3.2	Brown, medium SAND and GRAVEL, trace leaves, damp, FILL	5					0	120			
6-8	4 2 11 14	10	0.5	Brown, medium to coarse SAND and GRAVEL, moist, FILL						0	140			
8-10	14 23 11 8	30	0.6	Brown, medium SAND and GRAVEL, trace paper, trace wood fragments, wet, FILL						0	150			
10-12	7 14 10 8	25	0.1	Brown, medium SAND and GRAVEL, trace wood fragments, wet, FILL	10					0	40			
12-14	NA	30	0.1	Brown, coarse SAND and GRAVEL, wet, FILL						0	35			
14-16	6 2 3 3	0	NA	NO RECOVERY	15					NA	NA			14.0
16-18	3 2 2 2	15	0.1	Brown, fine SAND, trace gravel, wet, FILL						0	30			16.0
18-20	3 3 2 3	75	0.0	Brown, SILT and CLAY, trace wood fragments, wet, DREDGE SPOIL						0	40			18.0
20-22	2 1 3 1	75	0.4	Dark brown, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL	20					0	30			

WELL CONSTRUCTION



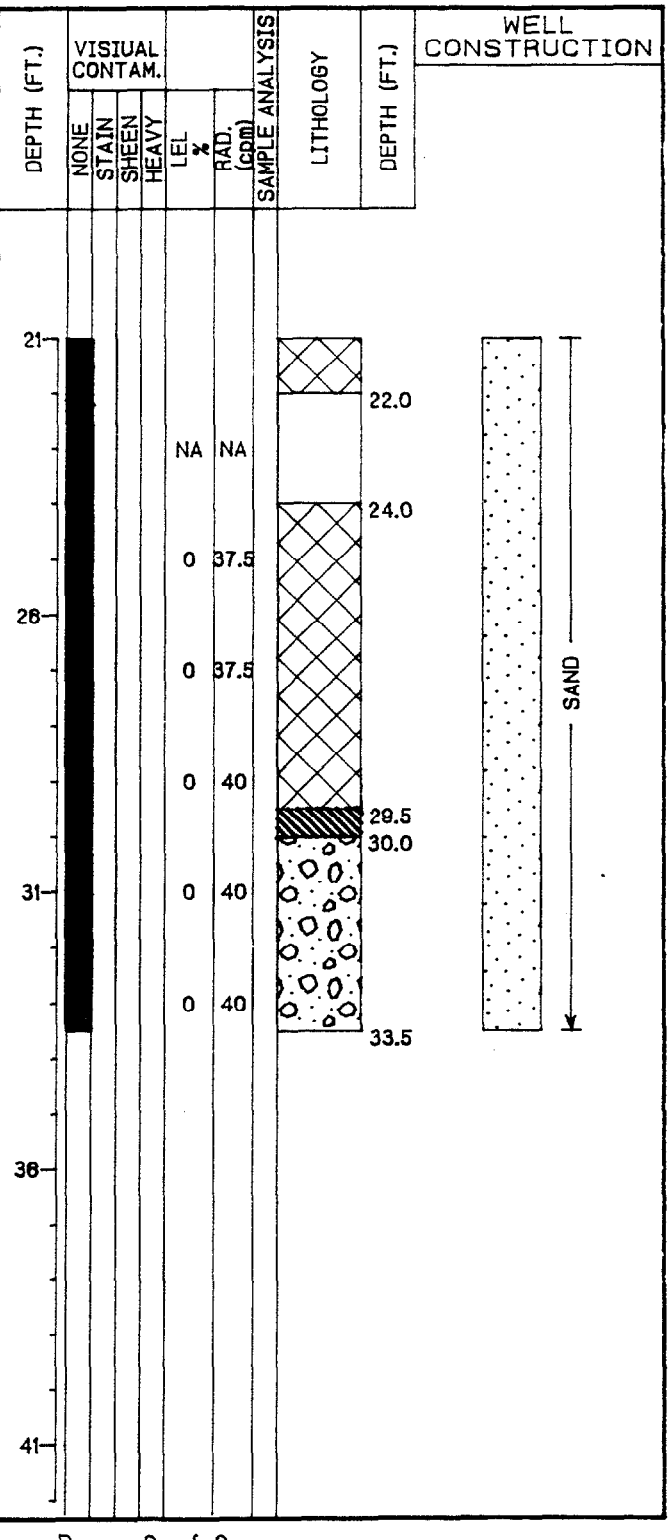
ATLANTIC

BORING LOG 2L MW 18S

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1258-10
LOCATION: AREA A LANDFILL
DATE STARTED: 08/03/90
DATA COMPLETED: 08/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: SCOTT METCALF
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 77.94
PROTECTIVE CASING ELEVATION: 77.84
WELL ELEVATION: 77.60
WATER LEVEL: 71.55 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, OVERCAST
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
20-22	2 1 3 1			
22-24	2 1 2 1	0	NA	NO RECOVERY
24-26	2 1 1 2	100	0.4	Dark brown, SILT and CLAY, trace shell fragments, wet, DREDGE SPOIL
26-28	2 3 3 2	100	0.1	
28-30	3 4 4 4	100	0.1	
30-32	5 12 24 96	75	0.3	Dark brown, fine SAND and SILT, trace root structures, wet, TOP SOIL Brown, fine SAND and GRAVEL, trace silt, wet
32-34	100/3	80	0.0	Brown, medium to coarse SAND and GRAVEL, wet AUGER REFUSAL AT 33.5 feet

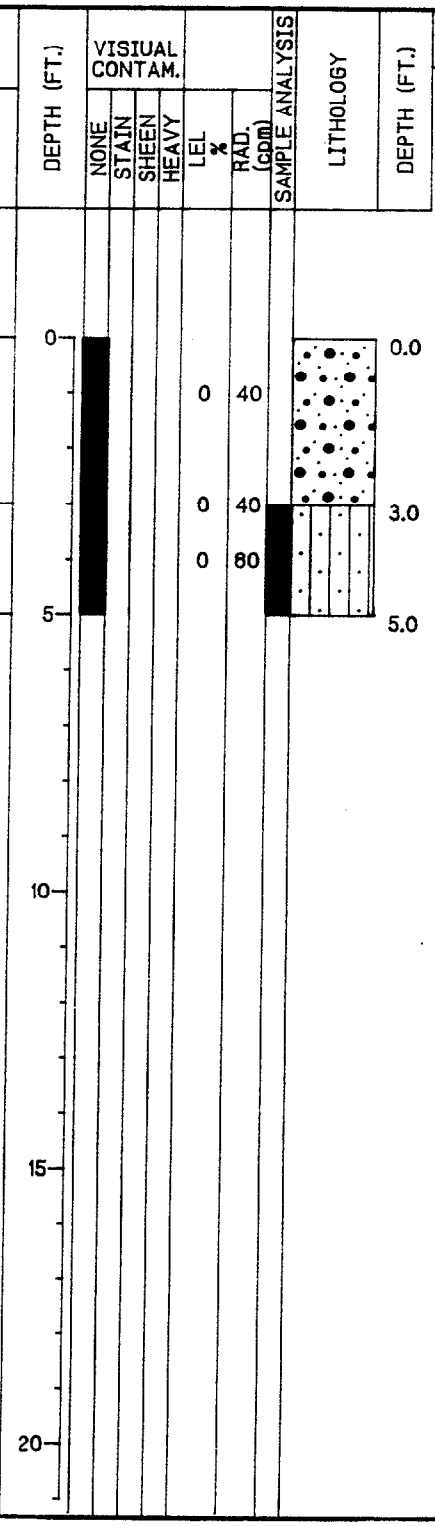


BORING LOG 2D MW 10S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 09/20/90
DATA COMPLETED: 09/20/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 52.8
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLEAR SKIES, LIGHT WIND
INSPECTOR: MICHAEL NEJDL
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	10 15 17 29	75	0.3	Brown, fine to coarse SAND, some silt, damp
2-4	3 7 17 64	25	0.3	Red-brown, fine SAND and SILT, wet at 5.0 feet
4-5	13 4 3 4	100	0.3	AUGER REFUSAL AT 5.0 feet NO WELL INSTALLED



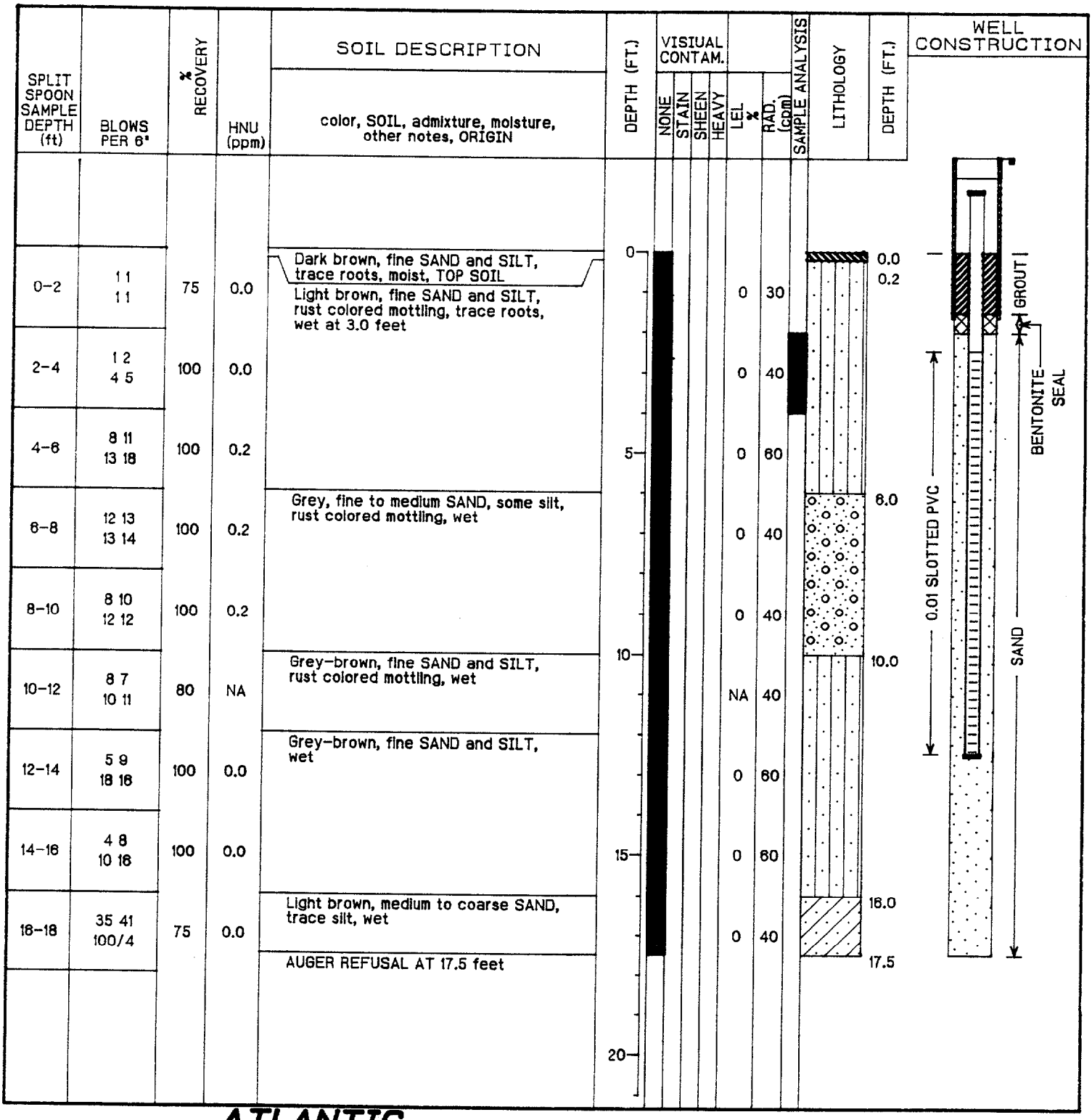
ATLANTIC

BORING LOG 2D MW 11S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 08/28/90
DATA COMPLETED: 08/28/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 45.4
PROTECTIVE CASING ELEVATION: 47.77
WELL ELEVATION: 46.85
WATER LEVEL: 44.75 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	1 1 1 1	75	0.0	Dark brown, fine SAND and SILT, trace roots, moist, TOP SOIL Light brown, fine SAND and SILT, rust colored mottling, trace roots, wet at 3.0 feet
2-4	1 2 4 5	100	0.0	
4-6	8 11 13 18	100	0.2	
6-8	12 13 13 14	100	0.2	Grey, fine to medium SAND, some silt, rust colored mottling, wet
8-10	8 10 12 12	100	0.2	
10-12	8 7 10 11	80	NA	Grey-brown, fine SAND and SILT, rust colored mottling, wet
12-14	5 9 18 16	100	0.0	Grey-brown, fine SAND and SILT, wet
14-16	4 8 10 16	100	0.0	
16-18	35 41 100/4	75	0.0	Light brown, medium to coarse SAND, trace silt, wet AUGER REFUSAL AT 17.5 feet



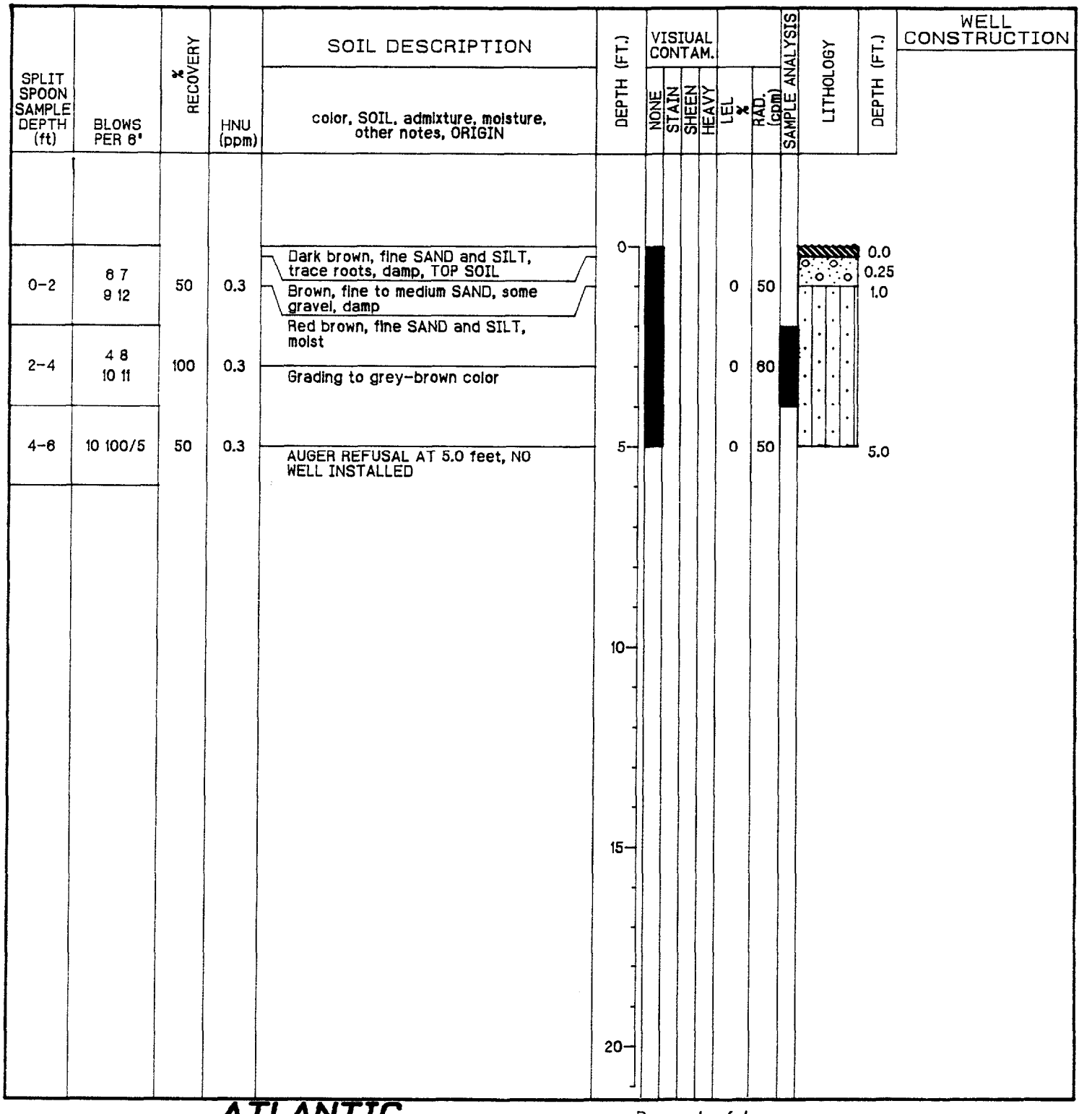
ATLANTIC

BORING LOG 2D MW 15S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 09/19/90
DATA COMPLETED: 09/19/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 42.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65', OVERCAST
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	6 7 9 12	50	0.3	Dark brown, fine SAND and SILT, trace roots, damp, TOP SOIL Brown, fine to medium SAND, some gravel, damp
2-4	4 8 10 11	100	0.3	Red brown, fine SAND and SILT, moist Grading to grey-brown color
4-6	10 100/5	50	0.3	AUGER REFUSAL AT 5.0 feet, NO WELL INSTALLED



ATLANTIC

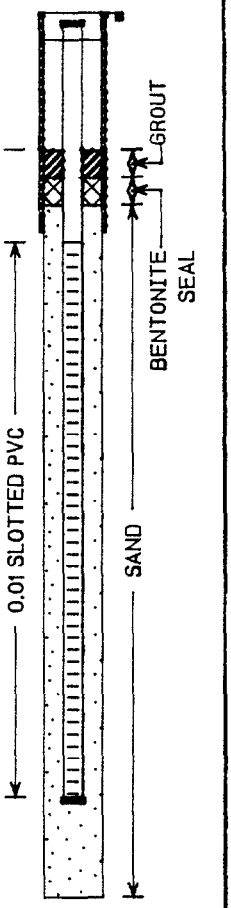
BORING LOG 2D MW 16S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 09/18/90
DATA COMPLETED: 09/19/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 35.6
PROTECTIVE CASING ELEVATION: 38.08
WELL ELEVATION: 37.85
WATER LEVEL: 34.30 (03/21/91)
DATUM: SUBASE
WEATHER: 60°, CLEAR SKIES, VERY WINDY
INSPECTOR: LYNN METCALF AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0									0.0
0-2	5 7 10 11	50	0.2	Dark brown, fine SAND and SILT, trace roots, moist, TOP SOIL Brown, medium to coarse SAND and GRAVEL, trace silt, moist						0	40			0.5
2-4	6 9 10 11	30	0.4							0	50			
4-6	100/5	5	0.2		5					0	50			
6-8	26 30 13 7	50	0.2	Grey, fine to very fine SAND and SILT, wet						1	50			6.0
8-10	8 20 31 45	60	0.2	Brown, fine to medium SAND and GRAVEL, trace silt, wet						1	40			8.0
10-12	42 100/5	100	0.2		10					1	50			
12-14	100/5	100	0.2							1	40			
				AUGER REFUSAL AT 13.5 feet	15									13.5
					20									

WELL CONSTRUCTION



ATLANTIC

OVER BANK DISPOSAL AREA (OBDA)

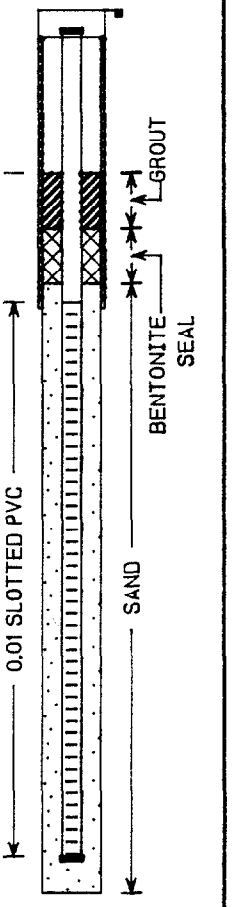
BORING LOG 3 MW 12S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: AREA A DOWNSTREAM
DATE STARTED: 08/28/90
DATA COMPLETED: 08/29/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JON YEATON
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 41.0
PROTECTIVE CASING ELEVATION: 43.95
WELL ELEVATION: 43.51
WATER LEVEL: 40.84 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
0-2	1 1 2 2	30	0.0	Grey, SILT AND CLAY, light brown-yellow mottling, moist	0					0	40			0.0
2-4	36 100/3	25	0.0	Grey, fine SAND and SILT, light brown-yellow mottling, boulder at 2.75 feet, damp						0	40			2.0 2.75
				Auger refusal at 3.0 feet, drilled with air rotary to 10.0 feet, some sand and boulders	5									
10-12	3 5 7 18	50	0.0	Light brown, fine SAND, 1.0 mm biotite lenses throughout, some iron staining from 11.5 to 12.0 feet	10					0	40			10.0
12-14	20 79	25	0.0	Light brown, fine to medium SAND and GRAVEL, wet						0	40			12.0
				AUGER REFUSAL AT 13.0 feet	15									13.0
					20									

WELL CONSTRUCTION



ATLANTIC

DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)

BORING LOG 6 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/11/90
DATA COMPLETED: 10/11/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.60
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75', PARTLY CLOUDY
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	17 12 12 12	30	0	Brown, fine SAND and GRAVEL, damp						0	20				
2-4	12 16 13 21	10	0	Grey-brown, fine to medium SAND and GRAVEL, damp						0	30				
4-6	10 11 14 17	25	0	Brown, medium to coarse SAND and GRAVEL, wet	5					0	40				
6-8	7 6 1 1	0	NA	NO RECOVERY						NA	NA			6.0	
8-10	5 4 3 3	100	0	Grey, fine to medium SAND and SILT, trace wood fragments, trace shell fragments, wet						0	40			8.0	
10-12	4 4 5 2	30	0		10					0	35				
12-14	4 4 5 3	75	0							0	40				
14-16	5 5 4 4	75	0		15					0	40				
16-18	7 7 8 10	25	0	Dark grey, medium to coarse SAND and GRAVEL, trace silt						0	40			16.0	
18-20	8 10 13 21	75	0	Grading to orange-brown						0	40				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

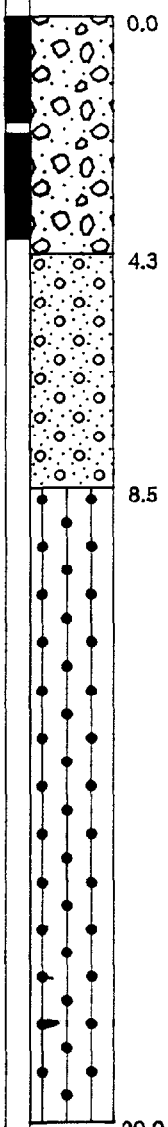
BORING LOG 6 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/04/90
DATA COMPLETED: 10/04/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLOUDY, WINDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	30 38 40 12	90	0.8	Brown, fine to coarse, SAND and GRAVEL, little silt, damp Wet at 4.0 feet
2-4	25 31 22 17	80	0.8	
4-6	18 17 21 17	75	0.8	Grey, fine to medium SAND, trace gravel, wet
6-8	12 8 4 3	50	1.0	
8-10	1 1 2 1	75	0.8	Black, SILT and CLAY, trace fine sand, trace wood fragments, trace shell fragments, wet
10-12	3 3 1 1	20	0.3	
12-14	4 3 2 1	80	0.3	
14-16	2 4 2 1	90	1.0	
16-18	1 1 1 1	50	0.8	
18-20	1 1 1 10	100	0.6	
				END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	50	
					1	50	
5					1	50	
					1	60	
10					1	60	
					1	50	
					1	50	
15					1	60	
					1	60	
					1	50	
20							



WELL CONSTRUCTION

ATLANTIC

BORING LOG 6 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/04/90
DATA COMPLETED: 10/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.50
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLOUDY, WINDY
INSPECTOR: ERIK NESS AND ANNA SULLIVAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	10 12 14 13	75	170	Brown, fine to coarse SAND and GRAVEL, some silt, damp						1	40				
2-4	12 16 21 20	05	3	Dark brown, medium to coarse SAND and GRAVEL, damp						1	50				
4-6	7 9 11 10	5	3	Dark brown, medium to coarse SAND and GRAVEL, large rock fragments, wood, wet	5					1	50				
6-8	10 6 4 1	40	160	Brown, fine to coarse SAND, some gravel, some wood fragments, wet						1	40			6.0	
8-10	3 2 1 1	0	NA	NO RECOVERY						NA	NA			8.0	
10-12	2 2 1 1	0	NA		10					NA	NA				
12-14	1 1 1 1	0	NA							NA	NA				
14-16	1 1 2 17	20	50	Brown, fine to coarse SAND, some gravel, some wood fragments, wet	15					1	50			14.0	
16-18	1 1 2 3	1	50	Grey, SILT and CLAY, trace fine sand, trace shell fragments, trace wood fragments, wet						1	50			16.0	
18-20	8 4 3 1	100	30							1	30				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

BORING LOG 6 TB 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/04/90
DATA COMPLETED: 10/04/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 5.60
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, CLOUDY
INSPECTOR: ERIK NESS AND ANNA SULLIVAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	20 40 45 50	80	0.2	0.0 - 0.1 ASPHALT Brown, fine to coarse SAND and GRAVEL, some silt, some charred wood pieces FILL						1	50			0.1	
2-4	20 45 7 4	20	25	Brown, fine to coarse SAND and GRAVEL, some silt, wet at 4.0 feet						1	50			2.0	
4-6	9 10 6 3	0	NA	NO RECOVERY	5						NA			4.0	
6-8	3 3 3 3	75	75	Grey, SILT and CLAY, trace fine sand, trace shell fragments, oil sheen, wet						1	50			6.0	
8-10	1 1 1 2	0	NA	NO RECOVERY							NA			8.0	
10-12	2 2 1 2	50	4	Grey, SILT and CLAY, trace fine sand, trace shell fragments, oil sheen, wet	10					1	50			10.0	
12-14	1 1 1 1	90	4							1	60				
14-16	2 1 1 2	100	4		15					1	40				
16-18	2 1 1 1	50	5							1	60				
18-20	1 1 1 1	100	1							1	60				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

BORING LOG 6 TB 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/03/90
DATA COMPLETED: 10/04/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 6.7
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS AND ANNA SULLIVAN
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
0-2	30 21 17 21	100	0.2	Brown, fine to coarse SAND and GRAVEL, trace silt, damp, FILL	0					0	40			0.0	
2-4	20 17 15 16	30	0.2	Black, coarse SAND and GRAVEL, trace silt, damp, FILL						0	50				
4-6	17 12 5 3	25	0.2	Brown, fine to coarse SAND and GRAVEL, trace silt, trace metal objects, wire, nails, etc., wet	5					0	40			6.0	
6-8	6 4 4 4	45	0.4	Brown, fine to coarse SAND and GRAVEL, some wood fragments, trace silt, wet						1	40				
8-10	6 20 65 8	80	0.4							1	50				
10-12	12 6 6 8	20	0.4		10					1	50				
12-14	8 7 7 4	100	0.4							1	40				
14-16	6 10 8 6	30	0.2		15					1	40			16.0	
16-18	10 100/5	50	0.2	END OF BORING AT 17.0 feet						1	50			17.0	
					20										

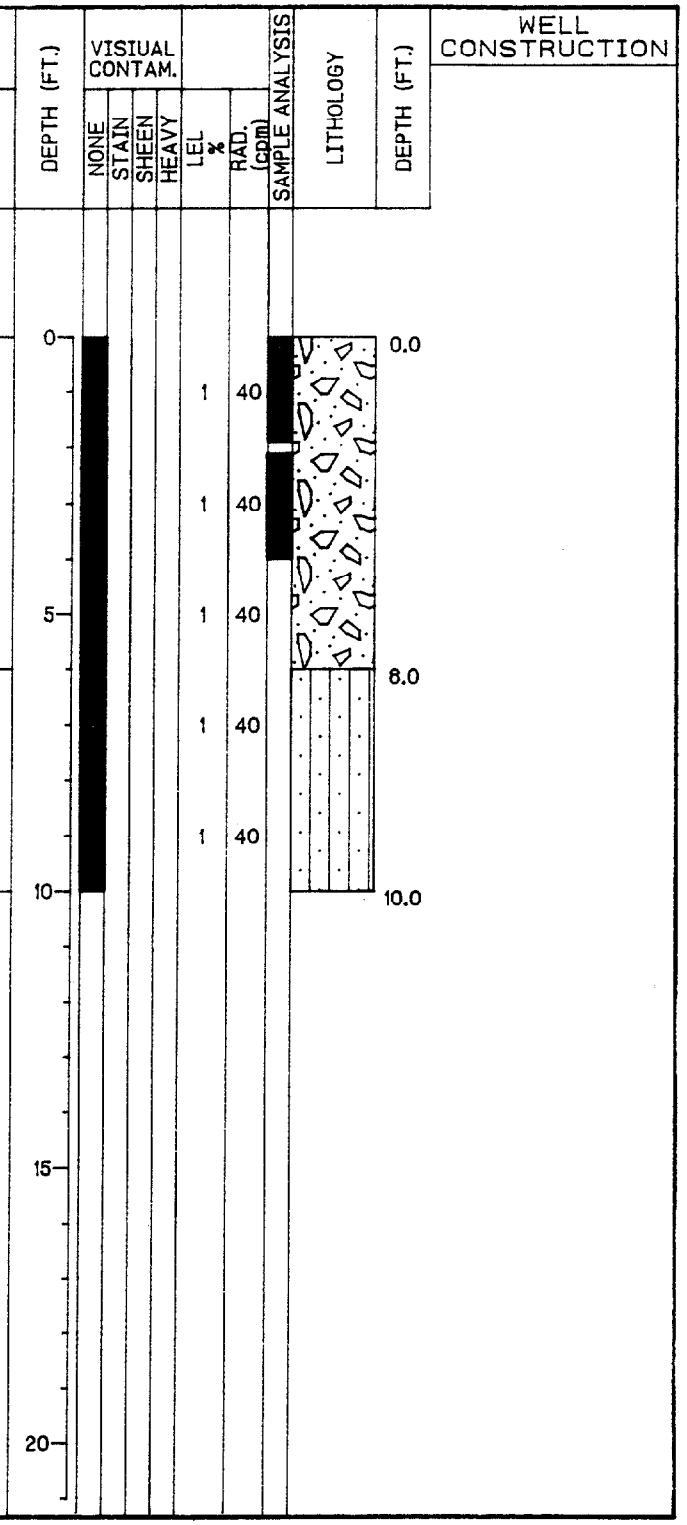
ATLANTIC

BORING LOG 6 TB 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 09/27/90
DATA COMPLETED: 09/27/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 4.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	25 20 17 9	100	0.2	Brown, fine to medium SAND and GRAVEL, trace silt, clay pipe, cement fragments, trace wood chips, damp, FILL
2-4	30 31 19 25	10	0.2	
4-6	6 3 5 4	5	0.2	
6-8	6 4 2 2	50	0.2	Brown, fine to medium SAND and SILT, wet
8-10	3 3 2 2	25	0.2	
				END OF BORING AT 10.0 feet



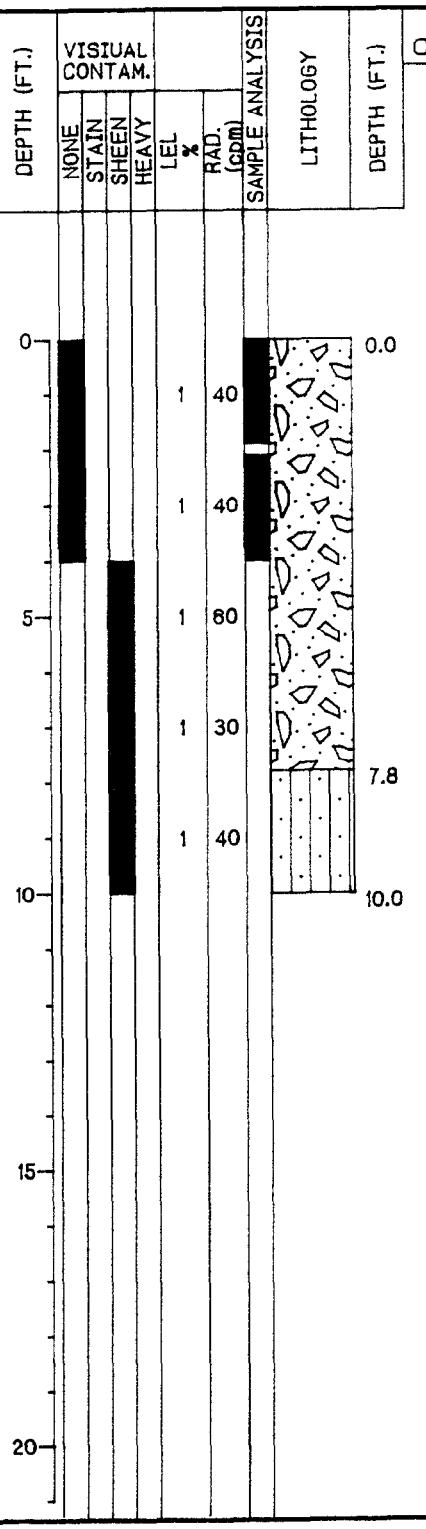
ATLANTIC

BORING LOG 6 TB 7

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 09/26/90
DATA COMPLETED: 09/26/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RABB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 5.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 65°, OVERCAST
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	24 39 68 29	60	0.2	Brown, fine to medium SAND and GRAVEL, trace metal fragments, large pieces of red brick, damp, FILL
2-4	21 30 25 27	40	0.2	
4-6	4 7 100/5	100	0.2	
6-8	1 7 17 6	5	0.2	
8-10	1 4 6 3	50	0.2	Grey-brown, fine SAND and SILT, some clay, trace shell fragments, oil sheen, wet
				END OF BORING AT 10.0 feet



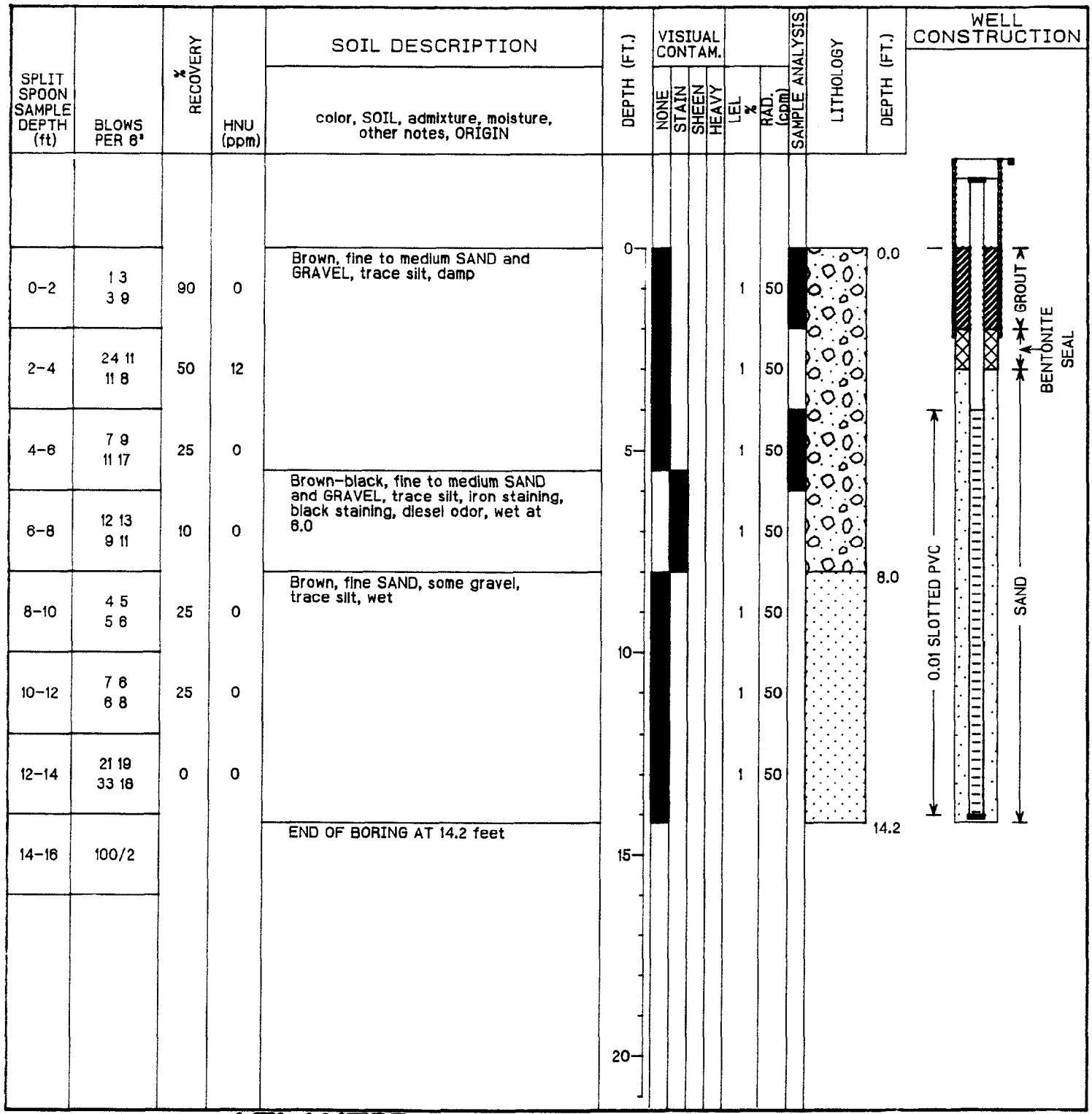
ATLANTIC

BORING LOG 6 MW 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/11/90
DATA COMPLETED: 10/11/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.0
PROTECTIVE CASING ELEVATION: 9.21
WELL ELEVATION: 8.63
WATER LEVEL: 1.28 (03/21/91)
DATUM: SUBASE
WEATHER: 85°, PARTLY CLOUDY
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	1 3 3 9	90	0	Brown, fine to medium SAND and GRAVEL, trace silt, damp
2-4	24 11 11 8	50	12	
4-6	7 9 11 17	25	0	
6-8	12 13 9 11	10	0	Brown-black, fine to medium SAND and GRAVEL, trace silt, iron staining, black staining, diesel odor, wet at 6.0
8-10	4 5 5 6	25	0	Brown, fine SAND, some gravel, trace silt, wet
10-12	7 6 6 8	25	0	
12-14	21 19 33 18	0	0	
14-16	100/2			END OF BORING AT 14.2 feet



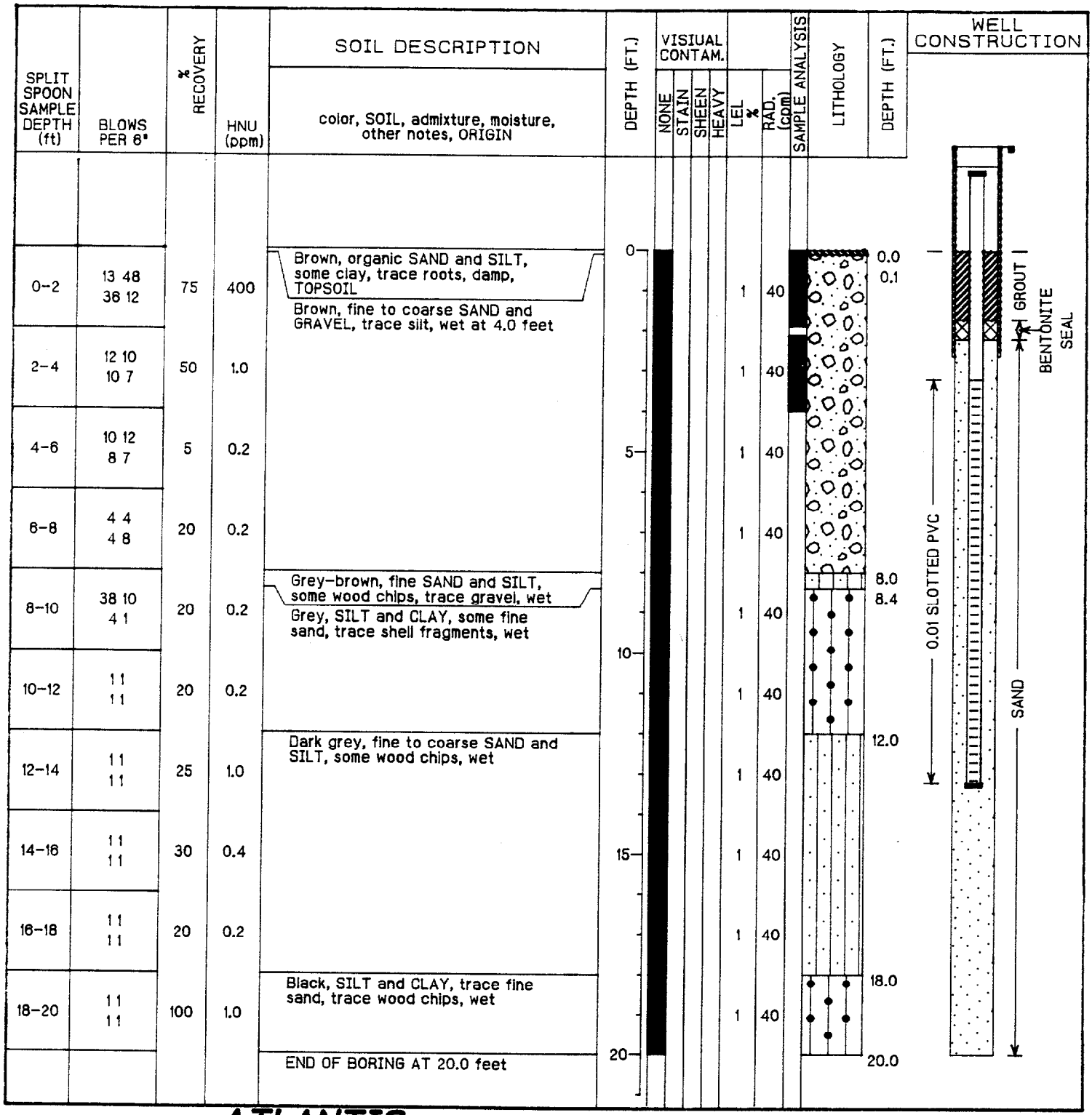
ATLANTIC

BORING LOG 6 MW 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: DRMO
DATE STARTED: 10/09/90
DATA COMPLETED: 10/09/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 5.4
PROTECTIVE CASING ELEVATION: 8.01
WELL ELEVATION: 7.3
WATER LEVEL: 1.12 (03/21/91)
DATUM: SUBASE
WEATHER: 65°, CLOUDY, OCCASIONAL SHOWERS
INSPECTOR: ERIK NESS AND LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	13 48 36 12	75	400	Brown, organic SAND and SILT, some clay, trace roots, damp, TOPSOIL Brown, fine to coarse SAND and GRAVEL, trace silt, wet at 4.0 feet
2-4	12 10 10 7	50	1.0	
4-6	10 12 8 7	5	0.2	
6-8	4 4 4 8	20	0.2	
8-10	38 10 4 1	20	0.2	Grey-brown, fine SAND and SILT, some wood chips, trace gravel, wet Grey, SILT and CLAY, some fine sand, trace shell fragments, wet
10-12	11 11	20	0.2	
12-14	11 11	25	1.0	Dark grey, fine to coarse SAND and SILT, some wood chips, wet
14-16	11 11	30	0.4	
16-18	11 11	20	0.2	
18-20	11 11	100	1.0	Black, SILT and CLAY, trace fine sand, trace wood chips, wet
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 6 MW 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/02/90
DATA COMPLETED: 10/02/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 4.3
PROTECTIVE CASING ELEVATION: 6.88
WELL ELEVATION: 6.10
WATER LEVEL: 1.23 (03/21/91)
DATUM: SUBASE
WEATHER: 65°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	12 21 33 40	80	0.1	Brown, fine to coarse SAND and GRAVEL, trace silt, trace wood chips, trace brick fragments, wet at 2.9 feet
2-4	16 15 13 7	50	0.1	
4-6	8 6 6 4	40	0.2	
6-8	16 8 8 7	50	0.1	
8-10	WOR	0	NA	NO RECOVERY
10-12	WOR	0	NA	
12-14	1 1 1 7	40	0.1	Gray, SILT and CLAY, trace fine sand, trace shell fragments, diesel odor, wet
14-16	18 9 3 1	10	0.2	Grey, SILT and CLAY, trace fine sand, trace shell fragments, trace wood chips, wet
16-18	18 10 1 2	50	0.4	
18-20	1 1 1 1	100	12	
				END OF BORING AT 20.0 feet

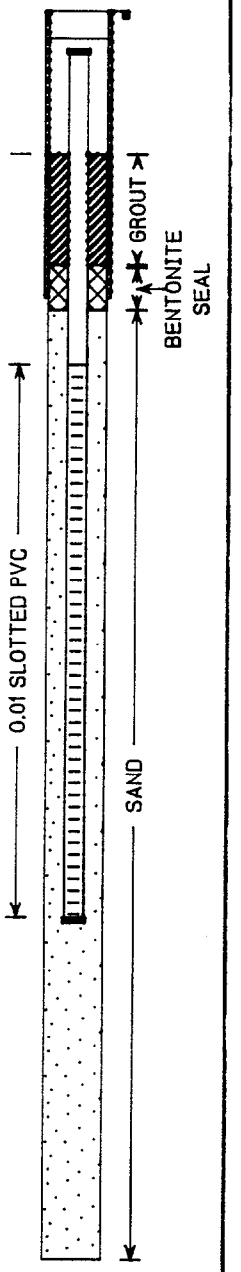
DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)
0					1	50
					1	50
5					1	40
					1	40
10					NA	NA
					NA	NA
					1	40
15					1	40
					1	50
20					1	60

SAMPLE ANALYSIS

LITHOLOGY

DEPTH (FT.)
0.0
8.0
12.0
20.0

WELL CONSTRUCTION



ATLANTIC

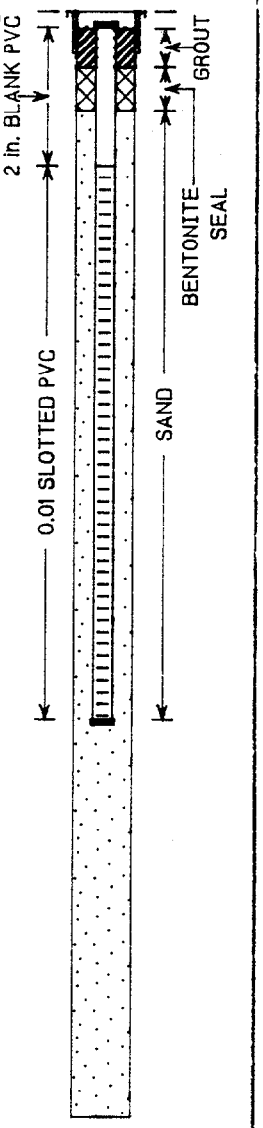
BORING LOG 6 MW 4

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 09/27/90
DATA COMPLETED: 09/27/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 5.18
PROTECTIVE CASING ELEVATION: 5.18
WELL ELEVATION: 4.9
WATER LEVEL: 1.19 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, CLEAR SKIES
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
0-2	25 30 17 12	75	0.4	0.0-0.5 ASPHALT Brown, fine to coarse SAND and GRAVEL, trace rusty metal, glass, FILL	0					1	40			0.0
2-4	7 7 9 11	10	0.4							1	40			
4-6	7 7 6 9	5	0.4	Brown, fine to coarse SAND and GRAVEL, trace silt, wet at 4.0 feet	5					1	40			4.0
6-8	10 11 11 15	1	0.4							1	50			
8-10	11 10 8 7	25	0.4							1	40			
10-12	1 5 3 2	10	0.4		10					1	40			
12-14	8 10 11 3	10	0.4							1	50			
14-16	7 9 11 4	10	0.4		15					1	50			
16-18	11 10 11 9	25	0.4							1	50			
18-20	4 4 4 6	0	NA							NA	NA			19.5
				Grey, SILT and CLAY, trace fine sand, trace shell fragments, wet END OF BORING AT 20.0 feet	20									20.0

WELL CONSTRUCTION



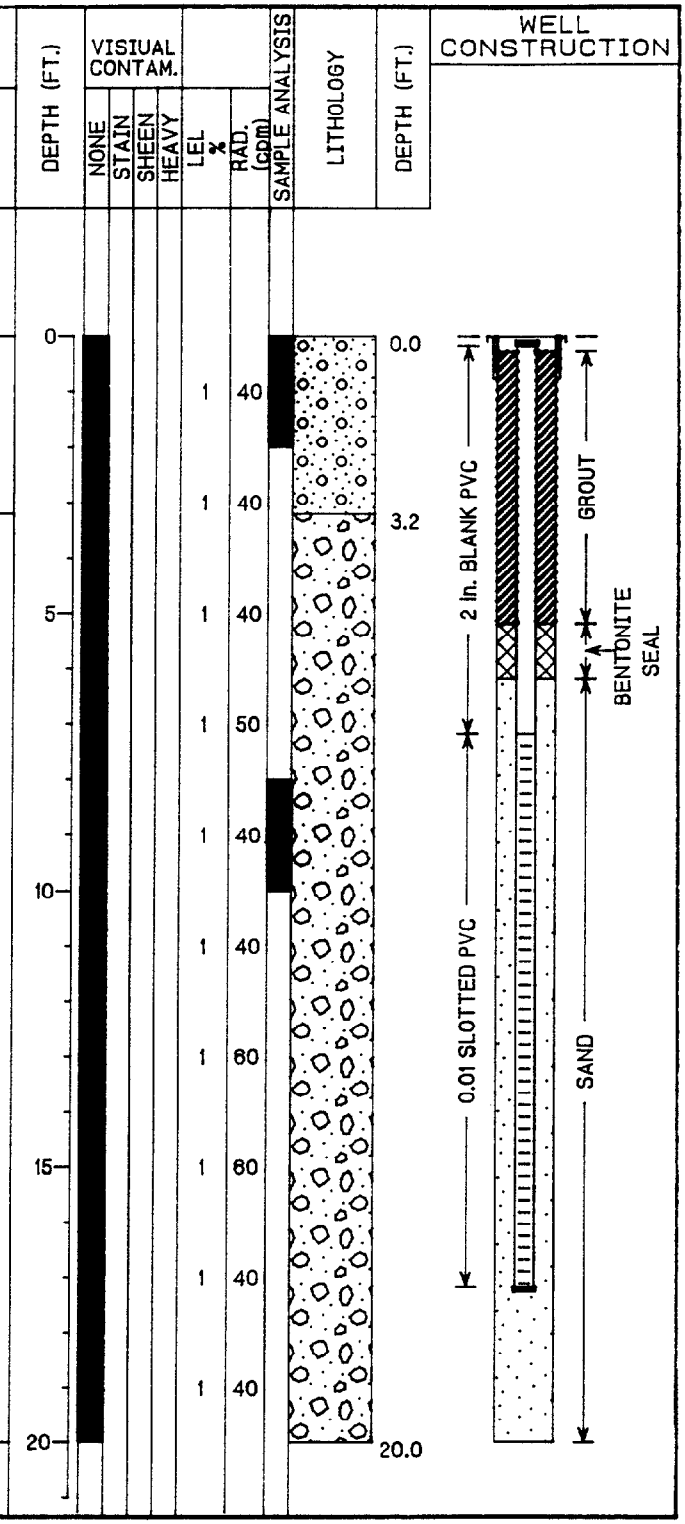
ATLANTIC

BORING LOG 6 MW 5S

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: DRMO
DATE STARTED: 10/15/90
DATA COMPLETED: 10/16/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: JOE RAAB
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 14.05
PROTECTIVE CASING ELEVATION: 14.05
WELL ELEVATION: 13.88
WATER LEVEL: 3.13 (03/21/91)
DATUM: SUBASE
WEATHER: 75°, PARTLY SUNNY
INSPECTOR: LYNN METCALF
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	9 5 7 4	75	0.6	Brown, fine to medium SAND, some gravel, trace silt, damp
2-4	10 10 12 18	100	0.8	
4-6	22 14 14 20	50	0.8	Brown, fine to coarse SAND and GRAVEL, trace silt, wet at 11.0 feet
6-8	18 21 30 35	75	0.8	
8-10	8 10 26 39	75	0.0	
10-12	19 25 75 100/5	75	0.0	
12-14	20 19 16 21	50	0.0	
14-16	26 24 21 30	100	0.0	
16-18	13 36 50 56	75	0.0	
18-20	56 72 85 70	100	0.6	
				END OF BORING AT 20.0 feet



ATLANTIC

LOWER SUBASE

BORING LOG 13 TB 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/14/90
DATA COMPLETED: 11/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.0
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 35°, CLEAR SKIES, LIGHT WIND
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	AUGER 25 26	10	0	Brown, fine to medium SAND and GRAVEL, some silt, damp, FILL						1	30				
2-4	40 96	10	0.4							1	40				
4-6	35 43 35 30	0	NA	NO RECOVERY	5					NA	NA			4.0	
6-8	27 29 14 16	25	55.0	WOOD CHIPS, FILL						1	50			6.0	
8-10	5 4 5 4	20	0.2	Brown, fine to coarse SAND, trace silt, trace gravel, wet						1	40			8.0	
10-12	3 9 8 3	75	0.2		10					1	40				
12-14	11 11	75	0.4							1	40				
14-16	2 3 3 2	50	0.2	Grey, fine SAND and SILT, trace clay, trace shell fragments, wet	15					1	40			13.7	
16-18	3 2 2 2	50	0.2							1	40				
18-20	2 1 2 2	100	0.2							1	40				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

BORING LOG 13 TB 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: LOWER BASE
DATE STARTED: 11/14/90
DATA COMPLETED: 11/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.8
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 35°, CLEAR SKIES, LIGHT WIND
INSPECTOR: CURTIS KRAEMER
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	AUGER	0	NA	Brown, fine to medium SAND and GRAVEL, some silt, damp, FILL oil stain at 5.7 feet, wet						NA	NA				
2-4	10 8 9 9	40	0.0							1	30				
4-6	8 9 11 75	40	10.0		5					1	50				
6-8	13 1 1 1	25	NA	WOOD CHIPS, FILL						NA	NA				
8-10	1 2 5 9	25	3.0	Brown, medium to coarse SAND, trace silt, trace gravel, wet with oil globules						1	40			8.0	
10-12	5 5 4 3	25	5.5		10					1	40				
12-14	2 1 1 1	0	NA	NO RECOVERY						NA	NA			12.0	
14-16	1 1 1 1	50	1.0	Brown, medium to coarse SAND, trace silt, trace gravel, wet with oil globules						1	40			14.0 14.5	
16-18	1 1 1 1	100	0.8	Grey, fine SAND and SILT, trace clay, trace shell fragments, trace wood fragments, wet	15					1	40				
18-20	1 1 1 1	100	1.5							1	50				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

BORING LOG 13 TB 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: LOWER BASE
DATE STARTED: 11/14/90
DATA COMPLETED: 11/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.9
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 40°, CLEAR SKIES, LIGHT WIND
INSPECTOR: CURTIS NICHOLS AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	AUGER 11 16	25	0.2	0.0 - 1.0 ASPHALT AND CONCRETE Brown, fine to medium SAND, some gravel, trace silt, damp, FILL						1	30			1.0	
2-4	18 15 18 33	75	3.8							1	40				
4-6	17 29 39 99	5	9.4	Oil stain	5					1	40				
6-8	19 5 4 3	50	8.5	Wet at 6.0 feet, oil globules in saturated zone, WOOD at 8.0 feet						1	40			8.0	
8-10	5 5 8 4	0	NA	NO RECOVERY						NA	NA				
10-12	3 3 2 1	0	NA		10					NA	NA				
12-14	2 2 2 2	50	4.0	Brown, medium to coarse SAND and GRAVEL, wet with oil globules						1	40			12.0	
14-16	4 5 10 6	100	6.5		15					1	40				
16-18	4 3 2 3	100	4.0							1	40				
18-20	1 3 1 1	100	2.5	Grey, fine SAND and SILT, trace clay, trace shell fragments, trace wood fragments, wet						1	40			17.8	
				END OF BORING AT 20.0 feet	20									20.0	

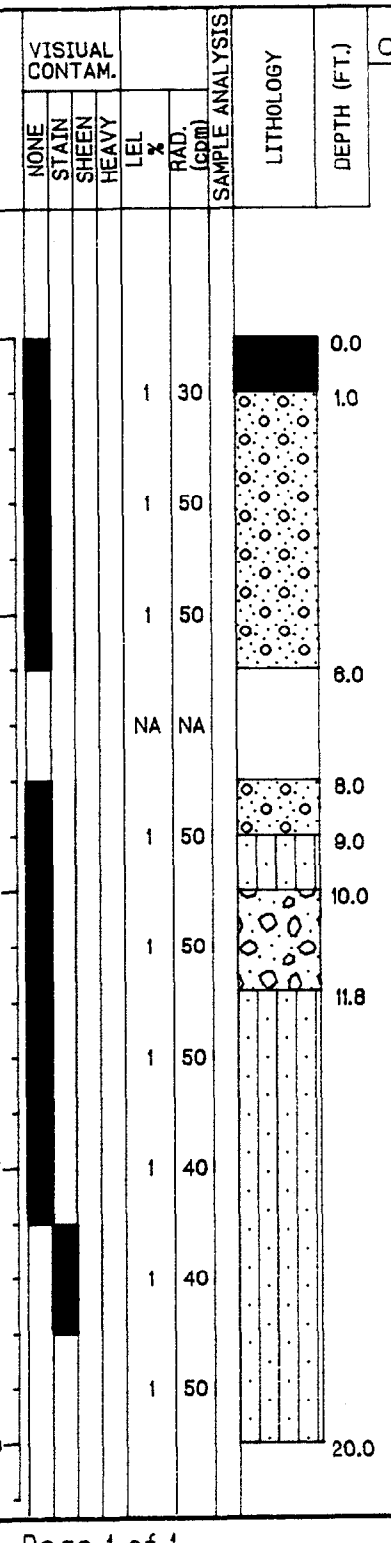
ATLANTIC

BORING LOG 13 TB 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: LOWER BASE
DATE STARTED: 11/14/90
DATA COMPLETED: 11/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.3
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, LIGHT WIND
INSPECTOR: CURTIS NICHOLS AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	AUGER 8 13	25	0.1	0.0 - 1.0 ASPHALT AND CONCRETE Brown, fine to medium SAND, some gravel, trace silt, damp,
2-4	13 13 10 9	25	0.2	
4-6	13 13 18 20	50	4.9	Rust colored stain from 4.8 - 5.0 feet
6-8	10 9 8 8	0	NA	NO RECOVERY
8-10	5 3 4 7	100	1.2	Brown, fine to medium SAND, some gravel, trace silt, damp, Brown, fine SAND and SILT, trace gravel, wet at 8.0 feet
10-12	11 8 9 4	50	0.5	Brown, medium to coarse SAND and GRAVEL, wet
12-14	1 1 1 1	25	0.3	Grey, fine SAND and SILT, trace clay, trace shell fragments, trace wood fragments, wet 16.0 - 18.0 Slight oil sheen
14-16	2 1 1 2	50	0.4	
16-18	1 1 1 1	25	0.4	
18-20	2 1 1 2	100	0.4	
				END OF BORING AT 20.0 feet



BORING LOG 13 TB 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/14/90
DATA COMPLETED: 11/14/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.2
PROTECTIVE CASING ELEVATION: -
WELL ELEVATION: -
WATER LEVEL: -
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, LIGHT WIND
INSPECTOR: CURTIS NICHOLS AND ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
					0									0.0	
0-2	AUGER	0	NA	0.0 - 1.0 ASPHALT AND CONCRETE						NA	NA			1.0	
2-4	4 9 9 8	0	NA	NO RECOVERY						NA	NA			2.0	
4-6	7 4 3 3	50	0.4	Brown, fine to medium SAND and GRAVEL, trace silt, trace cobbles, moist	5					1	30			4.0	
6-8	4 8 8 6	0	NA	NO RECOVERY						NA	NA			6.0	
8-10	5 6 7 4	50	0.4	Brown, fine to medium SAND and GRAVEL, trace silt, trace cobbles, moist Oil sheen at 12.0 feet						1	30			8.0	
10-12	5 1 1 1	50	0.7		10					1	30				
12-14	1 2 3 2	75	1.5							1	30			14.0	
14-16	4 3 2 2	75	9.0	Brown, fine SAND, some gravel, oil sheen, wet	15					1	30				
16-18	2 1 1 1	100	3.0							1	30			18.0	
18-20	3 4 4 4	100	9.5	Brown, medium to coarse SAND and GRAVEL, trace silt, trace cobbles, wet						1	30				
				END OF BORING AT 20.0 feet	20									20.0	

ATLANTIC

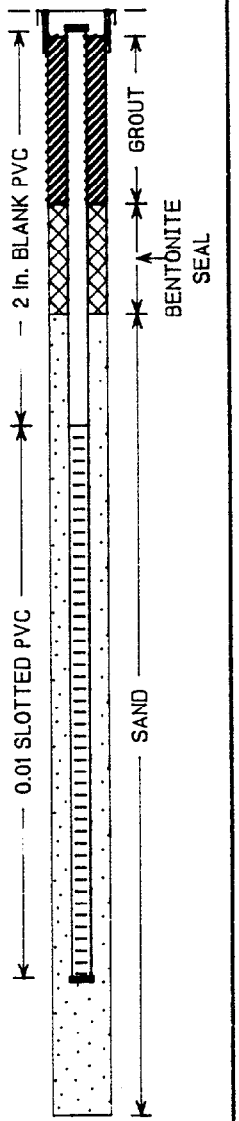
BORING LOG 13 MW 1

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/05/90
DATA COMPLETED: 11/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 13.73
PROTECTIVE CASING ELEVATION: 13.73
WELL ELEVATION: 13.36
WATER LEVEL: 3.58 (03/21/91)
DATUM: SUBASE
WEATHER: 70°, PARTLY CLOUDY
INSPECTOR: ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0									0.0
0-2	AUGER 23 13	75	0.3	0.0 - 0.5 ASPHALT Brown, fine to medium SAND and SILT, trace gravel, damp Light brown, fine to coarse SAND and GRAVEL, trace silt, damp						1	50			0.5 1.0
2-4	7 8 6 7	80	1.5							1	40			
4-6	3 4 4 10	50	1.0		5					1	60			
6-8	22 18 13 10	50	0.5							1	30			
8-10	15 15 18 23	75	1.2							1	60			
10-12	11 17 21 27	75	15.0	Diesel odor, wet at 10.0 feet	10					1	60			
12-14	21 100/2	40	30.0	Grading to gray color						1	60			
14-16	17 21 32 11	50	1.0	Grading to light brown	15					1	60			
16-18	11 11 11 14	50	1.0							1	40			
18-20	7 20 31 45	100	3.0	Grading to gray, fine to medium SAND at bottom of spoon						1	60			
				END OF BORING AT 20.0 feet	20									20.0

WELL CONSTRUCTION



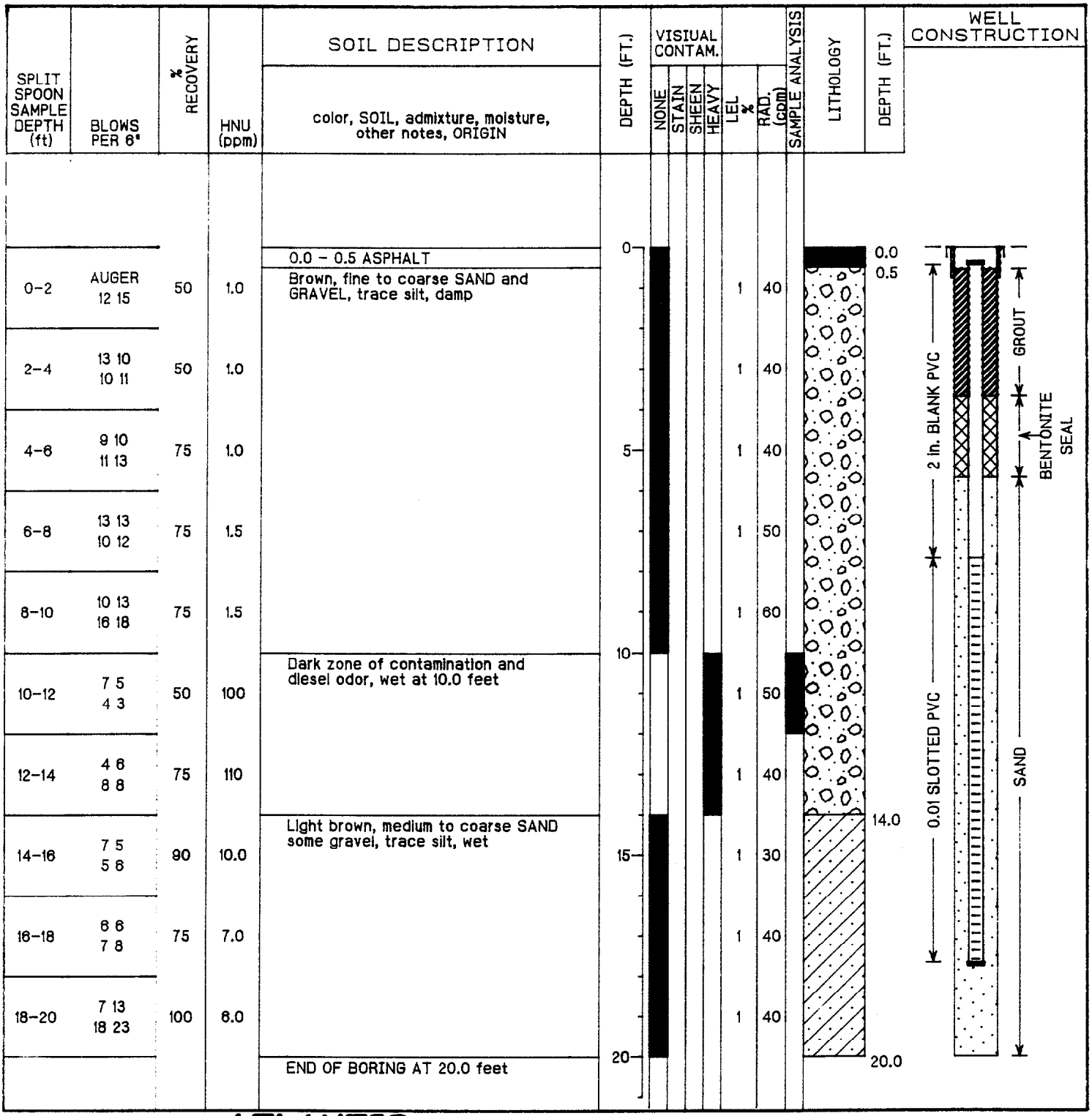
ATLANTIC

BORING LOG 13 MW 2

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/05/90
DATA COMPLETED: 11/05/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 13.23
PROTECTIVE CASING ELEVATION: 13.23
WELL ELEVATION: 12.80
WATER LEVEL: 3.59 (03/21/91)
DATUM: SUBASE
WEATHER: 70°, PARTLY CLOUDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
				0.0 - 0.5 ASPHALT
0-2	AUGER 12 15	50	1.0	Brown, fine to coarse SAND and GRAVEL, trace silt, damp
2-4	13 10 10 11	50	1.0	
4-6	9 10 11 13	75	1.0	
6-8	13 13 10 12	75	1.5	
8-10	10 13 16 18	75	1.5	
10-12	7 5 4 3	50	100	Dark zone of contamination and diesel odor, wet at 10.0 feet
12-14	4 6 8 8	75	110	
14-16	7 5 5 6	90	10.0	Light brown, medium to coarse SAND some gravel, trace silt, wet
16-18	6 6 7 8	75	7.0	
18-20	7 13 18 23	100	6.0	
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 13 MW 3

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 13.15
PROTECTIVE CASING ELEVATION: 13.15
WELL ELEVATION: 12.89
WATER LEVEL: 3.56 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

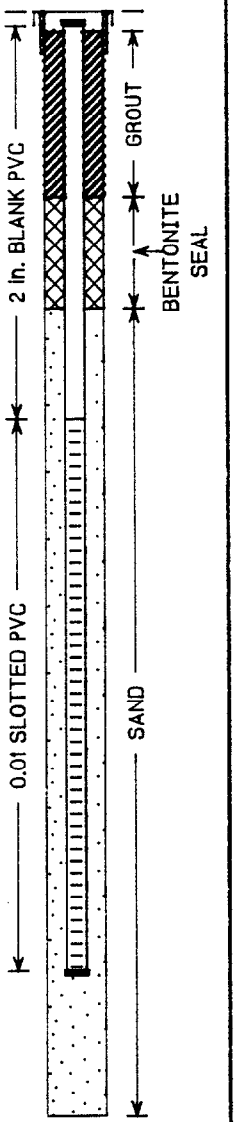
SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	9 8 9 7	50	0.5	Brown, organic silt, and medium sand, trace root structures, damp TOP SOIL Brown, medium SAND and SILT, trace cobbles, damp
2-4	6 4 4 8	30	0.5	
4-6	9 12 12 13	0	NA	NO RECOVERY
6-8	3 5 5 7	40	1.0	Light brown, coarse SAND, trace silt, trace cobbles, wet at 10.0 feet
8-10	6 7 5 6	70	15.0	
10-12	9 8 6 6	100	50.0	Dark zone of contamination and diesel odor, wet
12-14	6 9 11 12	50	90.0	
14-16	8 9 13 12	50	50.0	
16-18	5 9 7 13	50	22.0	Light brown, fine to medium SAND, trace gravel, trace silt, wet
18-20	11 13 14 17	100	20.0	
				Light brown, fine to medium SAND and GRAVEL, trace silt, wet END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	60	
5					NA	NA	
10					1	40	
15					1	60	
20					1	40	

LITHOLOGY

DEPTH (FT.): 0.0, 1.0, 4.0, 6.0, 16.0, 19.5, 20.0

WELL CONSTRUCTION



ATLANTIC

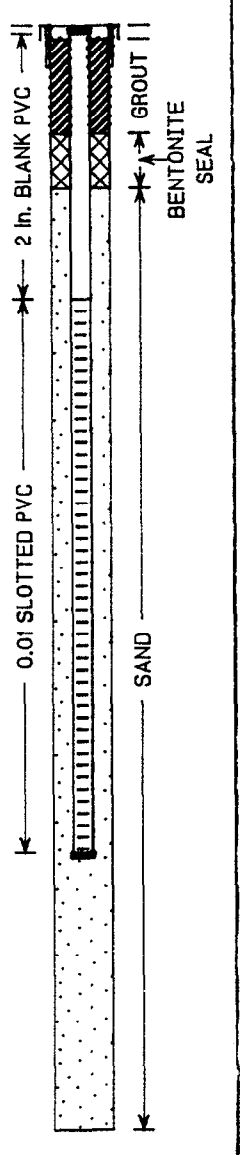
BORING LOG 13 MW 4

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 10.29
PROTECTIVE CASING ELEVATION: 10.29
WELL ELEVATION: 10.14
WATER LEVEL: 1.88 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, CLEAR SKIES
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0									0.0
0-2	AUGER 21 24	40	16.0	0.0 - 0.2 ASPHALT Brown, fine to coarse SAND and GRAVEL, some silt, damp, FILL						1	60			0.2
				2.0 - 2.5 ASPHALT										2.0
2-4	30 20 14 9	50	13.0	Brown, fine to coarse SAND and GRAVEL, some silt, trace cobbles, damp						1	50			2.5
4-6	9 10 8 7	50	15.0	Warm split spoon	5					1	40			
6-8	4 8 8 3	50	15.0	Wet at 6.0 feet, outside of spoon hot						1	40			
8-10	40 4 3 7	0	NA	NO RECOVERY						NA	NA			8.0
10-12	3 3 4 3	5	NA	WASH, slight oil sheen on water	10					NA	NA			
12-14	3 2 2 6	0	NA	NO RECOVERY						NA	NA			
14-16	8 10 9 10	50	10.0	Grey, medium to coarse SAND, trace silt, trace gravel, wet, (water is hot)	15					1	40			14.0
16-18	4 3 7 4	50	17.0	Grey, fine to coarse SAND and GRAVEL, trace silt, oil sheen, wet, (water is hot)						1	50			16.0
18-20	4 8 9 7	100	17.0							1	40			
				END OF BORING AT 20.0 feet	20									20.0

WELL CONSTRUCTION



ATLANTIC

BORING LOG 13 MW 5

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/08/90
DATA COMPLETED: 11/08/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 11.72
PROTECTIVE CASING ELEVATION: 11.72
WELL ELEVATION: 11.13
WATER LEVEL: 2.17 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	8 8 9 10	50	11.5	Brown, organic silt, medium SAND, trace root structures, damp, TOP SOIL Brown, medium SAND, trace silt, trace gravel, damp
2-4	9 11 10 12	70	13.0	
4-6	9 13 9 9	30	13.0	Brown, medium to coarse SAND and GRAVEL, some silt, trace cobbles, damp wet at 10.0 feet
6-8	23 13 14 10	30	9.5	
8-10	13 10 15 15	40	9.0	
10-12	15 18 27 16	20	8.5	
12-14	14 17 25 25	20	8.0	
14-16	7 7 4 5	100	6.5	Grey, medium to coarse SAND, trace gravel, trace silt, wet Dark brown, PEAT with roots, trace fine sand, wet
16-18	4 3 2 3	0	NA	NO RECOVERY
18-20	3 2 1 1	100	50.0	Grey-brown, fine to medium SAND, trace gravel, wet
				END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					1	40	
5					1	40	
10					1	40	
15					1	40	
20					1	NA	
					1	40	

LITHOLOGY / DEPTH (FT.): 0.0, 1.0, 4.0, 14.0, 15.2, 16.0, 18.0, 20.0

WELL CONSTRUCTION: 2 in. BLANK PVC, 0.01 SLOTTED PVC, GROUT, BENTONITE SEAL, SAND

ATLANTIC

BORING LOG 13 MW 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/13/90
DATA COMPLETED: 11/13/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 21.84
PROTECTIVE CASING ELEVATION: 21.84
WELL ELEVATION: 21.47
WATER LEVEL: 2.86 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	AUGER	0	NA	CEMENT AND ASPHALT Brown, fine to medium SAND and GRAVEL, trace silt, damp
2-4	18 11 12 14	100	8.0	Brown, medium to coarse SAND, some gravel, damp
4-6	9 8 8 10	100	14.5	
6-8	8 9 10 15	75	4.5	
8-10	12 18 32 22	100	7.0	
10-12	8 8 9 8	75	30.0	Light brown, coarse SAND and GRAVEL, trace cobbles, moist
12-14	10 10 11 11	75	15.0	
14-16	9 8 10 9	100	500	
16-18	7 8 10 10	50	20.0	Light brown, fine to medium SAND, trace gravel, wet at 18.0 feet
18-20	7 7 10 11	100	1.0	
				AUGER TO 28.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0					NA	NA	
5					1	30	
10					1	40	
15					1	60	
20					1	30	

LITHOLOGY: 0.0, 1.0, 3.0, 10.0, 16.0, 20.0

WELL CONSTRUCTION: 2 in. BLANK PVC; 10.01 SLOTTED PVC; GROUT; BENTONITE SEAL; SAND

ATLANTIC

BORING LOG 13 MW 6

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/13/90
DATA COMPLETED: 11/13/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 21.84
PROTECTIVE CASING ELEVATION: 21.84
WELL ELEVATION: 21.47
WATER LEVEL: 2.86 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM.: NONE / STAIN / SHEEN / HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)	WELL CONSTRUCTION
28-30	7 4 4 5	100	0.2	Light brown, fine to medium SAND, trace gravel, wet	21 26 31 36 41	HEAVY	1	40			28.0 30.0	0.01 SLOTTED PVC SAND
				END OF BORING AT 28.0 feet								

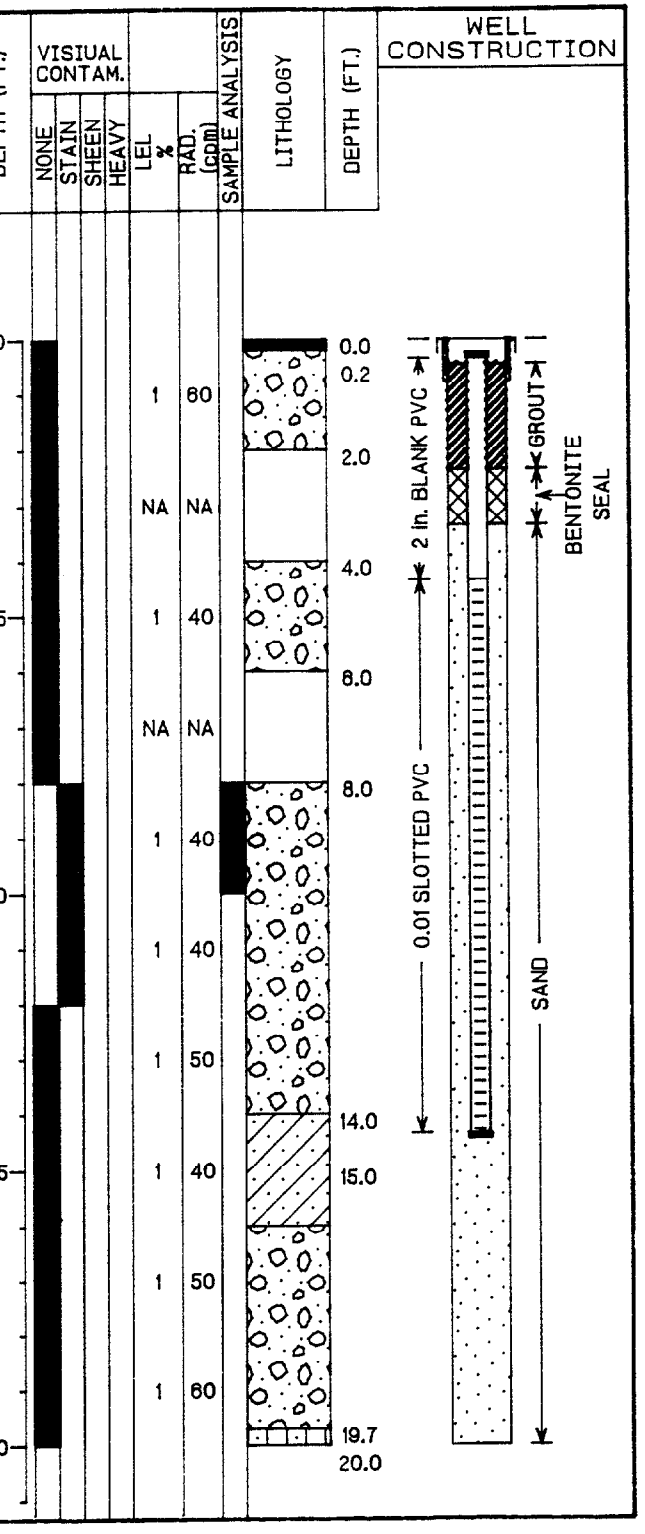
ATLANTIC

BORING LOG 13 MW 7

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.19
PROTECTIVE CASING ELEVATION: 8.19
WELL ELEVATION: 7.85
WATER LEVEL: 2.22 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, PARTLY CLOUDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	AUGER 14 11	50	14.0	0.0 - 0.2 ASPHALT Brown, fine to coarse SAND and GRAVEL, some silt, damp,
2-4	10 12 13 9	0	NA	NO RECOVERY
4-6	6 5 4 3	25	13.5	Brown, fine to coarse SAND and GRAVEL, some silt, trace cobbles, damp
6-8	3 4 3 3	0	NA	NO RECOVERY
8-10	5 5 4 5	50	24.0	Brown, medium to coarse SAND and GRAVEL, some cobbles, grading to grey stain, diesel odor, wet at 12.0 feet
10-12	7 5 4 2	5	30.0	
12-14	8 7 4 2	50	25.0	Brown, medium to coarse SAND and GRAVEL, some cobbles, wet
14-16	4 3 2 1	10	13.0	Grey, medium to coarse SAND, some gravel, wet
16-18	5 5 2 5	50	16.0	Grey, medium to coarse SAND and GRAVEL, wet
18-20	3 3 2 2	90	12.0	
				Grey, fine SAND and SILT, trace clay, trace shell fragments, trace wood fragments, wet END OF BORING AT 20.0 feet



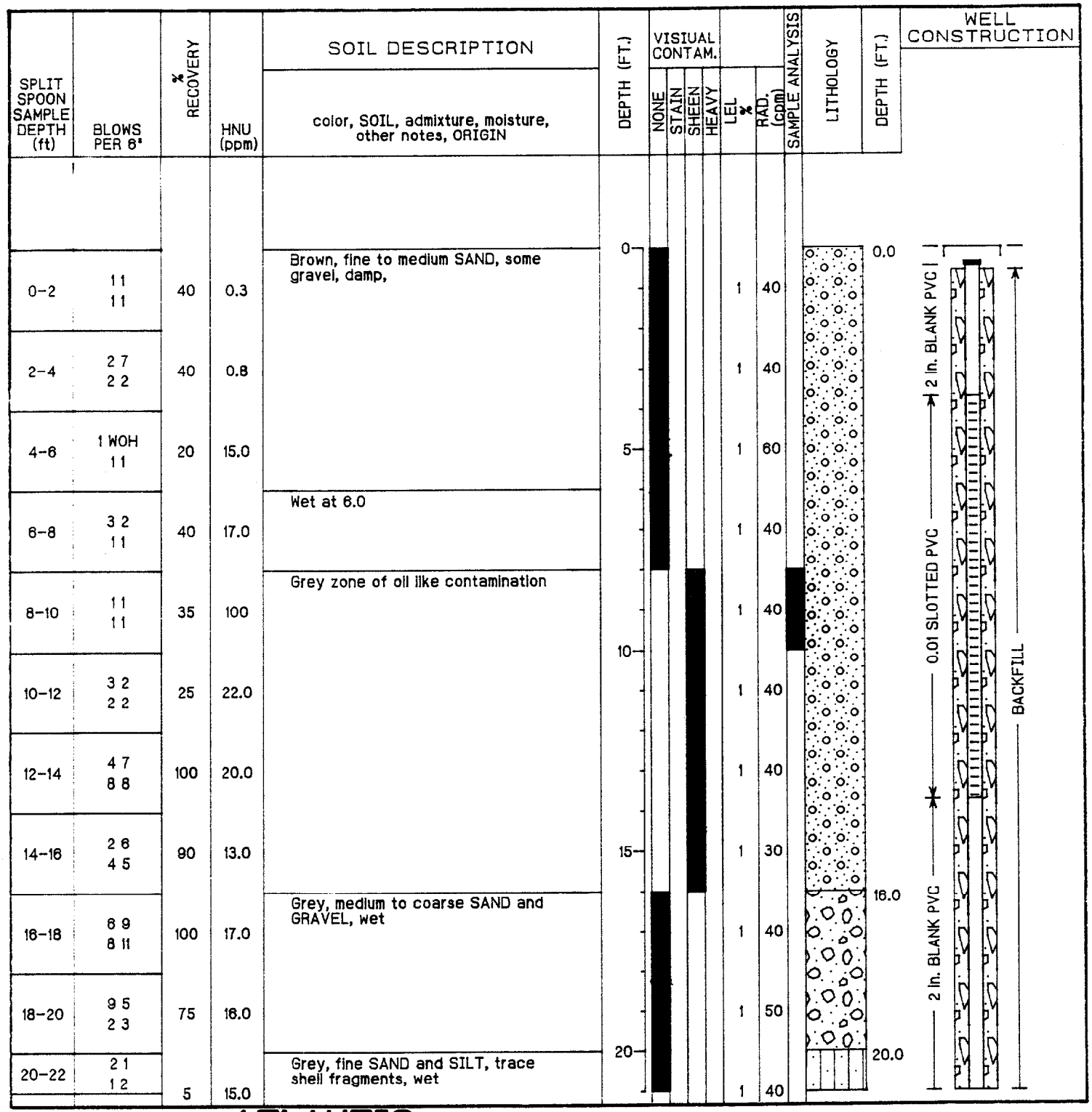
ATLANTIC

BORING LOG 13 MW 8

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1258-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.80
PROTECTIVE CASING ELEVATION: 7.80
WELL ELEVATION: 7.34
WATER LEVEL: 0.99 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, LIGHT CLOUD COVER
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
	1			
0-2	1 1 1 1	40	0.3	Brown, fine to medium SAND, some gravel, damp,
2-4	2 7 2 2	40	0.8	
4-6	1 WOH 1 1	20	15.0	
6-8	3 2 1 1	40	17.0	Wet at 6.0
8-10	1 1 1 1	35	100	Grey zone of oil like contamination
10-12	3 2 2 2	25	22.0	
12-14	4 7 8 8	100	20.0	
14-16	2 6 4 5	90	13.0	
16-18	8 9 8 11	100	17.0	Grey, medium to coarse SAND and GRAVEL, wet
18-20	9 5 2 3	75	16.0	
20-22	2 1 1 2	5	15.0	Grey, fine SAND and SILT, trace shell fragments, wet



ATLANTIC

BORING LOG 13 MW 8

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.80
PROTECTIVE CASING ELEVATION: 7.80
WELL ELEVATION: 7.34
WATER LEVEL: 0.99 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, LIGHT CLOUD COVER
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
20–22	2 1 1 2			
				AUGER TO 25.0 feet
25–27	1 1 1 1	80	5.0	Grey, fine SAND and SILT, trace shell fragments, wet
				END OF BORING AT 27.0 feet

DEPTH (FT.): 21, 26, 31, 36, 41

VISUAL CONTAM.: NONE, STAIN, SHEEN, HEAVY

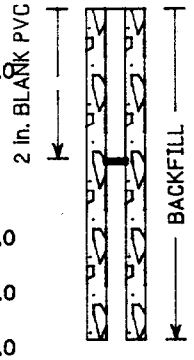
LEL %: 1
RAD. (cpm): 60

SAMPLE ANALYSIS

LITHOLOGY

DEPTH (FT.): 22.0, 25.0, 26.0, 27.0

WELL CONSTRUCTION

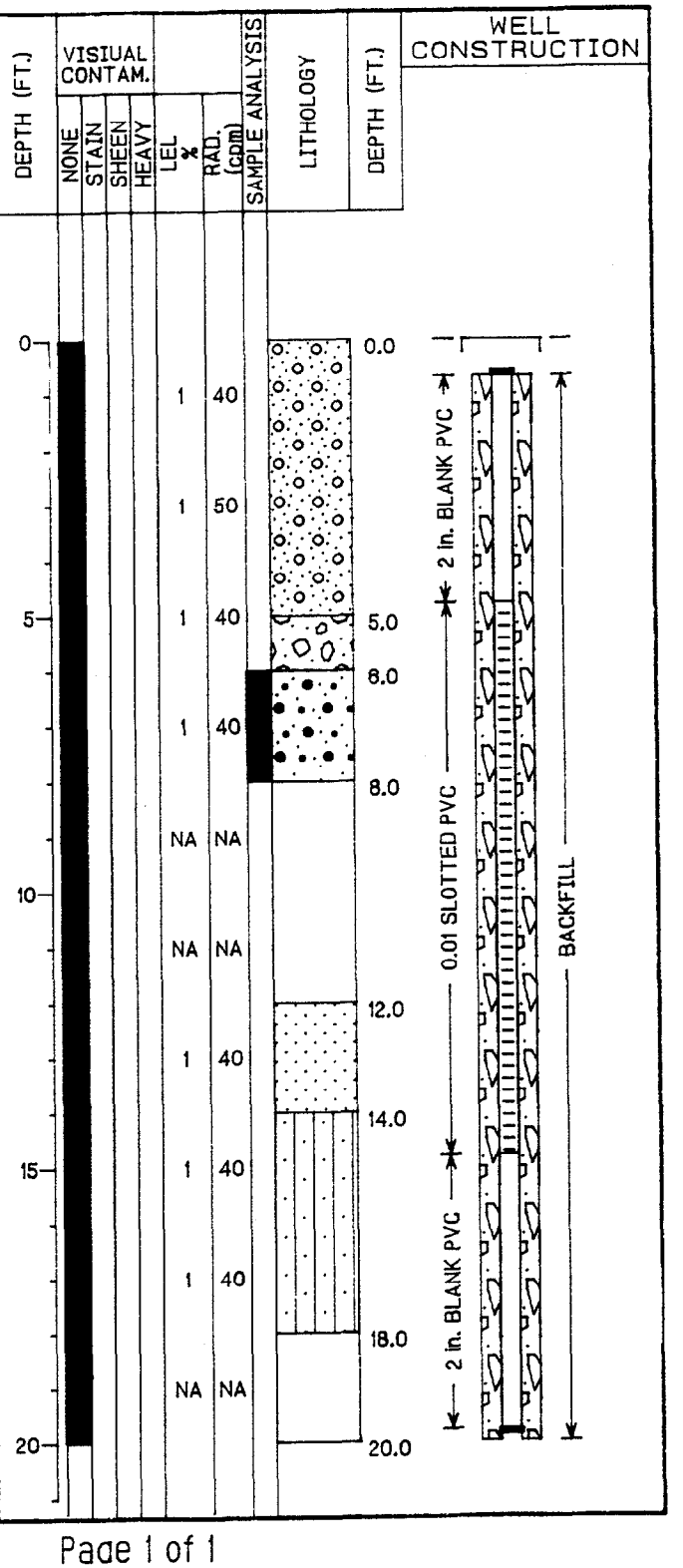


BORING LOG 13 MW 9

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/07/90
DATA COMPLETED: 11/07/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.57
PROTECTIVE CASING ELEVATION: 7.57
WELL ELEVATION: 8.91
WATER LEVEL: 0.76 (03/21/91)
DATUM: SUBASE
WEATHER: 50°, PARTLY CLOUDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	12 11	50	12.0	Light brown, fine to medium SAND, trace gravel, damp Wet at 4.0 feet
2-4	12 23	50	14.0	
4-6	11 12	75	14.0	Dark brown, medium to coarse SAND and GRAVEL, trace silt, wet
6-8	23 41	50	15.0	Light brown, fine to coarse SAND, trace gravel trace silt, wet, grading to grey color
8-10	11 11	0	NA	NO RECOVERY
10-12	32 12	0	NA	
12-14	65 11	25	17.0	Grey, fine SAND, some silt, trace gravel, wet
14-16	11 11	75	15.0	Grey, fine SAND and SILT, trace shell fragments, wet
16-18	21 21	100	13.6	
18-20	12 22	0	NA	NO RECOVERY
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 13 MW 10

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/08/90
DATA COMPLETED: 11/08/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.73
PROTECTIVE CASING ELEVATION: 8.73
WELL ELEVATION: 8.44
WATER LEVEL: 2.17 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, PARTLY CLOUDY, WINDY
INSPECTOR: CURTIS NICHOLS ERIK NESS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	AUGER			Auger to 6.0 feet to avoid driving split spoon through utility lines.
2-4				
4-6				
6-8	6 8 10 11	50	13.0	Light brown, fine to medium SAND, some gravel, damp
8-10	7 7 6 8	10	15.0	Brown, fine to coarse SAND and GRAVEL, some cobbles, wet at 8.0 feet
10-12	4 4 5 4	25	10.0	
12-14	5 4 12 37	80	15.0	
14-16	19 12 13 20	90	13.0	
16-18	32 11 9 9	100	12.0	
18-20	10 12 15 10	100	NA	Brown, medium to coarse SAND, some gravel, wet
				END OF BORING AT 20.0 feet

DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
0							
5							
10							
15							
20							
					1	40	
					1	40	
					1	40	
					1	40	
					1	40	
					NA	NA	

LITHOLOGY

DEPTH (FT.): 0.0, 6.0, 8.0, 18.0, 20.0

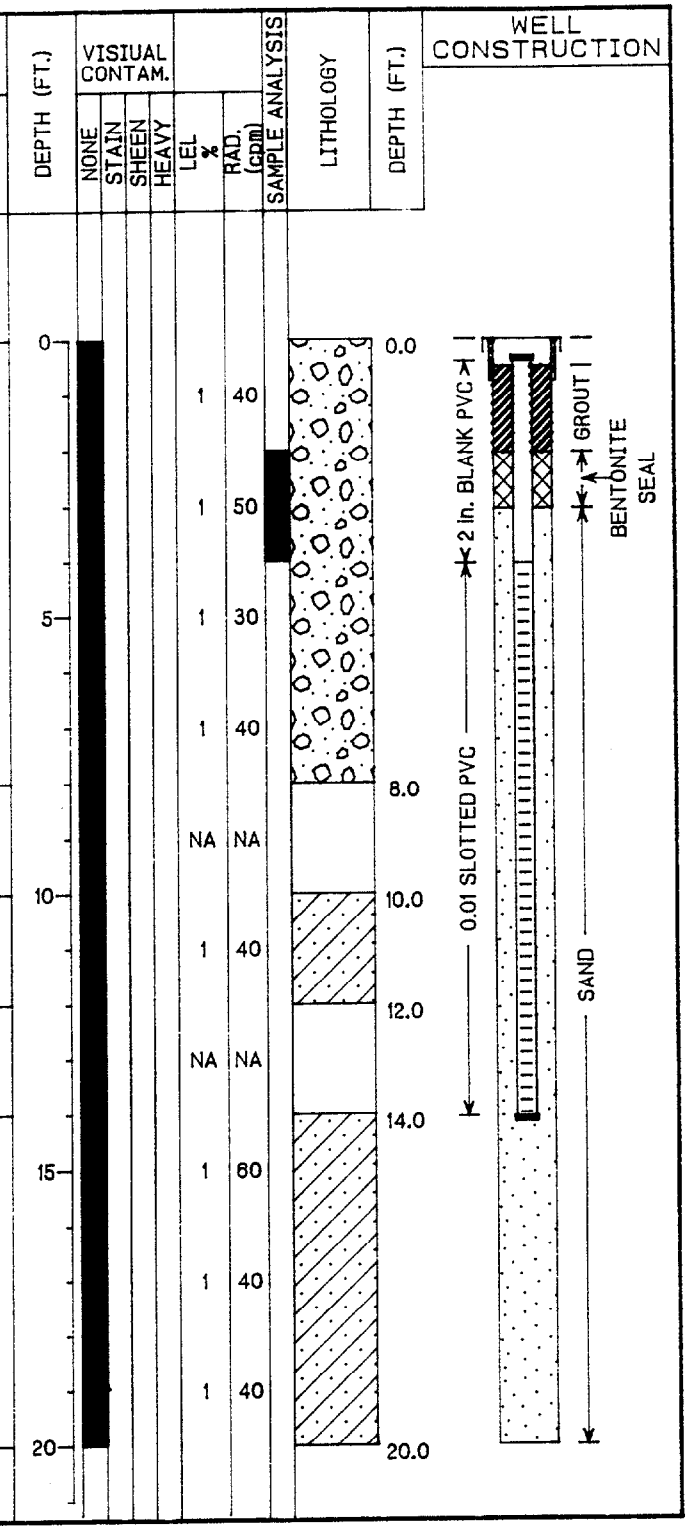
WELL CONSTRUCTION
2 in. BLANK PVC
0.01 SLOTTED PVC
GROUT
BENTONITE SEAL
SAND

BORING LOG 13 MW 11

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/08/90
DATA COMPLETED: 11/08/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.23
PROTECTIVE CASING ELEVATION: 8.23
WELL ELEVATION: 7.83
WATER LEVEL: 2.13 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND ROBERT PRENTISS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	15 27 17 12	60	5.0	Brown, fine to coarse SAND and GRAVEL, trace cobbles, trace silt, damp Grading to grey and wet at 6.0 feet.
2-4	11 10 12 10	50	12.0	
4-6	12 9 9 13	50	11.0	
6-8	5 5 5 5	10	6.0	
8-10	5 5 5 5	0	NA	NO RECOVERY
10-12	5 5 5 3	25	5.0	Grey, medium to coarse SAND, wet
12-14	4 3 4 2	0	NA	NO RECOVERY
14-16	5 2 2 2	50	5.0	Grey, medium to coarse SAND, wet
16-18	4 12 13 10	100	4.0	
18-20	11 14 16 14	100	3.0	
				END OF BORING AT 20.0 feet



ATLANTIC

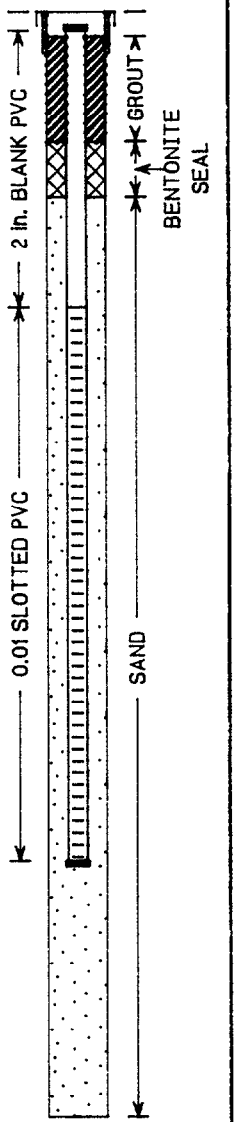
BORING LOG 13 MW 12

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/08/90
DATA COMPLETED: 11/08/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 9.55
PROTECTIVE CASING ELEVATION: 9.55
WELL ELEVATION: 9.21
WATER LEVEL: 2.92 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0									0.0
0-2	AUGER 4 3	50	15.0	ASPHALT AND CONCRETE Light brown, fine to coarse SAND and GRAVEL, damp Brown, fine to medium SAND and SILT, damp						1	40			0.4 0.5 1.0
2-4	25 16 12 11	50	20.0	Light brown, fine to medium SAND and GRAVEL, damp						1	40			
4-6	7 20 4 5	25	13.0		5					1	45			
6-8	3 3 2 2	0	NA	NO RECOVERY						NA	NA			6.0
8-10	2 1 1 1	75	22.0	Grey, fine to medium SAND, some gravel, some silt, diesel odor, wet at 8.0 feet						1	40			8.0
10-12	WOH WOH 1 WOH	5	32.0	Grey, fine SAND, some silt, wet	10					1	40			10.0
12-14	WOH WOH 3 2	100	15.0	Grey, fine to medium SAND and GRAVEL, some silt, wet						1	40			12.0
14-16	1 2 1 1	100	16.0		15					1	30			
16-18	2 2 2 3	0	NA	NO RECOVERY						NA	NA			16.0
18-20	4 4 5 7	100	20.0	Grey, fine to medium SAND and GRAVEL, some silt, wet Grey, fine SAND and SILT, trace wood fragments, trace gravel, wet						1	40			18.0 19.0
				END OF BORING AT 20.0 feet	20									20.0

WELL CONSTRUCTION



ATLANTIC

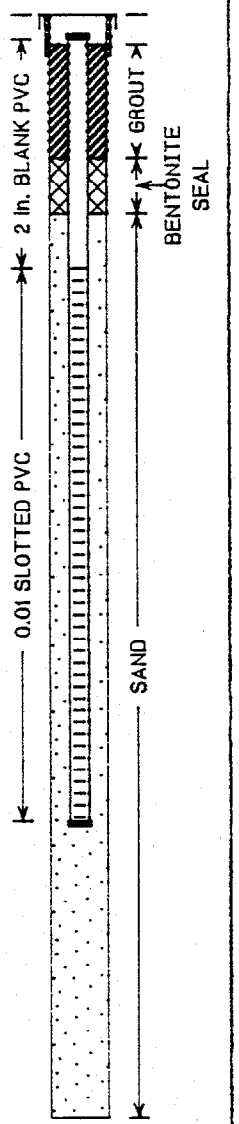
BORING LOG 13 MW 13

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/13/90
DATA COMPLETED: 11/13/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.84
PROTECTIVE CASING ELEVATION: 8.94
WELL ELEVATION: 8.50
WATER LEVEL: 3.03 (03/21/91)
DATUM: SUBASE
WEATHER: 40°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISUAL CONTAM.: NONE / STAIN / SHEEN / HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0						0.0
0-2	AUGER 7 7	40	0.2	ASPHALT AND CONCRETE Dark brown, fine to medium SAND and GRAVEL, some cobbles, damp			1	30			0.5
2-4	7 7 7 7	40	0.2				1	30			4.0
4-6	6 6 6 7	0	NA	NO RECOVERY	5		NA	NA			
6-8	17 8 8 7	40	0.5	Dark brown, fine to medium SAND, some gravel, some cobbles, wet at 8.0 feet			1	40			8.0
8-10	8 31 17 8	50	4.0				1	40			
10-12	6 4 6 6	50	1.0	Grey, fine SAND and SILT, trace shell fragments, trace wood, wet	10		1	40			10.0
12-14	4 2 1 2	50	0.5				1	40			
14-16	5 4 7 4	50	0.2	Grey, fine SAND, trace silt, trace wood, wet	15		1	40			14.0
16-18	5 4 4 5	50	0.2	Light brown, fine to medium SAND and GRAVEL, trace cobbles, wet			1	50			16.0
18-20	5 6 8 9	50	0.5				1	40			
				END OF BORING AT 20.0 feet	20						20.0

WELL CONSTRUCTION



ATLANTIC

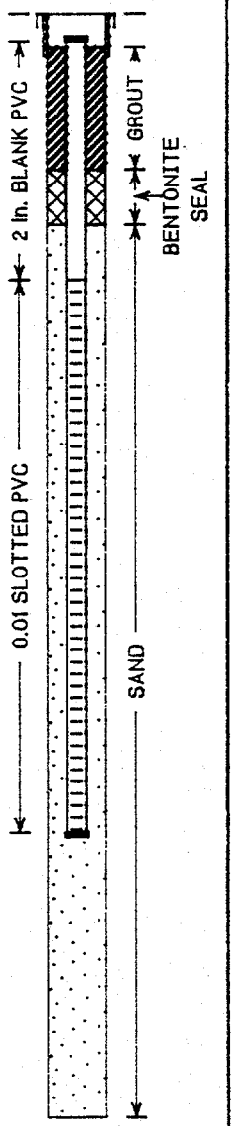
BORING LOG 13 MW 14

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/13/90
DATA COMPLETED: 11/13/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 8.48
PROTECTIVE CASING ELEVATION: 8.48
WELL ELEVATION: 7.98
WATER LEVEL: 0.45 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS	LITHOLOGY	DEPTH (FT.)
					0									0.0
0-2	AUGER 17 18	50	0.0	ASPHALT AND CONCRETE Dark brown, fine to medium SAND and GRAVEL, trace cobbles, damp Wet at 8.0 feet.						1	60			0.5
2-4	7 8 8 9	50	1.0							1	60			
4-6	11 11 13 9	50	10.0		5					1	40			
6-8	11 18 13 10	10	90.0							1	40			
8-10	8 8 7 8	5	90.0							1	40			
10-12	8 31 90 75	0	NA	NO RECOVERY	10					NA	NA			10.0
12-14	35 29 19 13	100	450	Brown, medium to coarse GRAVEL, some sand, some cobbles, wet						1	40			12.0
14-16	13 15 15 10	100	300		15					1	40			
16-18	13 14 12 14	50	70.0	Grey, fine SAND and SILT, trace shell fragments, trace wood, oil sheen at top spoon, wet						1	40			16.0
18-20	16 12 14 12	50	30.0	Grey, fine SAND, trace silt, wet						1	40			18.0
				END OF BORING AT 20.0 feet	20									20.0

WELL CONSTRUCTION



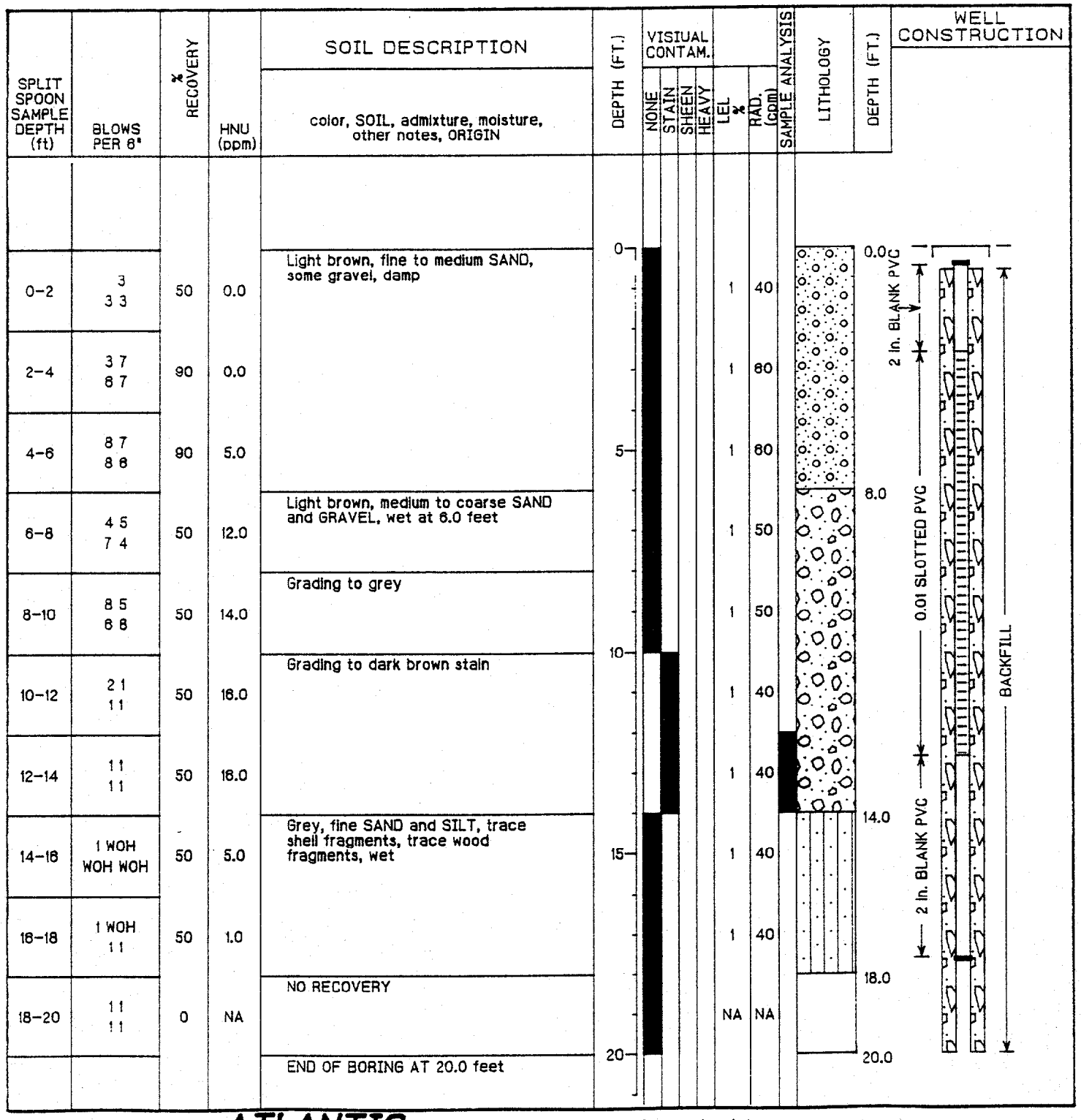
ATLANTIC

BORING LOG 13 MW 15

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/12/90
DATA COMPLETED: 11/12/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.70
PROTECTIVE CASING ELEVATION: 7.70
WELL ELEVATION: 7.25
WATER LEVEL: 0.30 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	3 3 3	50	0.0	Light brown, fine to medium SAND, some gravel, damp
2-4	3 7 8 7	90	0.0	
4-6	8 7 8 8	90	5.0	
6-8	4 5 7 4	50	12.0	Light brown, medium to coarse SAND and GRAVEL, wet at 6.0 feet
8-10	8 5 6 8	50	14.0	Grading to grey
10-12	2 1 1 1	50	16.0	Grading to dark brown stain
12-14	1 1 1 1	50	16.0	
14-16	1 WOH WOH WOH	50	5.0	Grey, fine SAND and SILT, trace shell fragments, trace wood fragments, wet
16-18	1 WOH 1 1	50	1.0	
18-20	1 1 1 1	0	NA	NO RECOVERY
				END OF BORING AT 20.0 feet



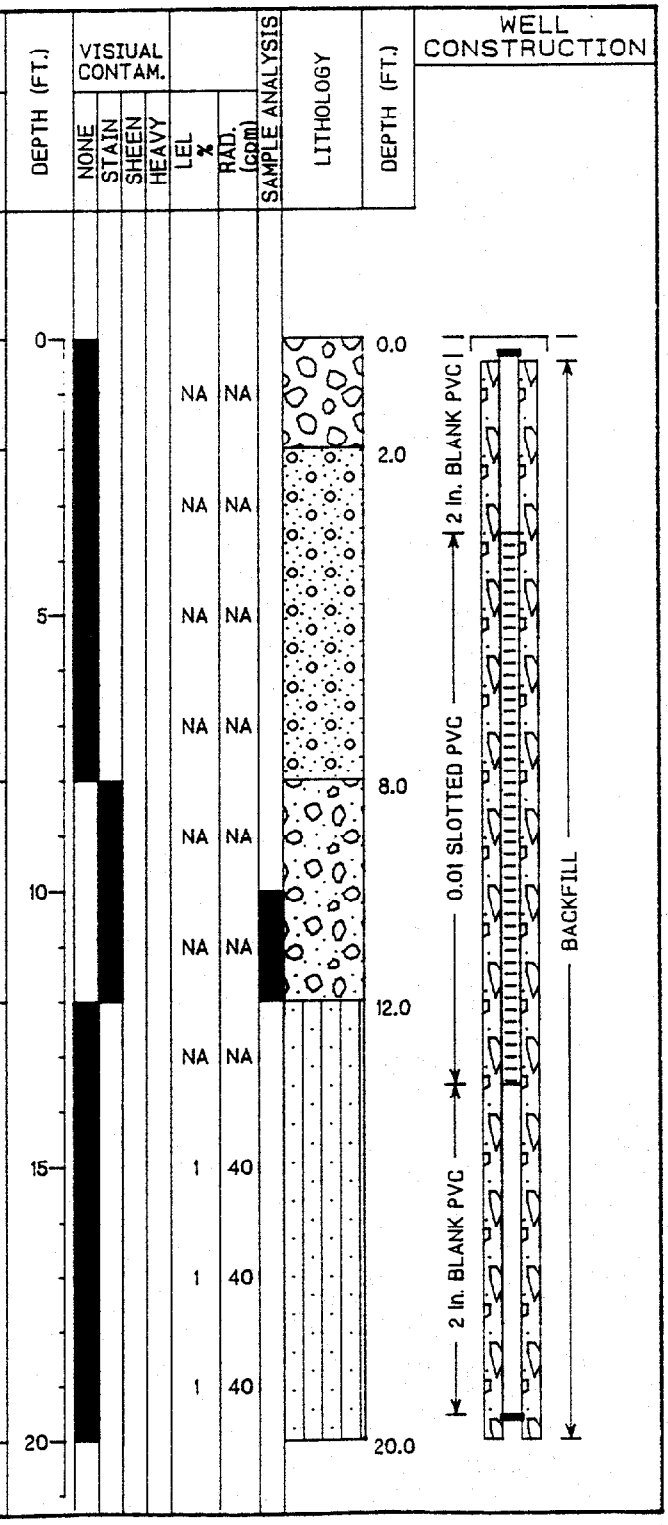
ATLANTIC

BORING LOG 13 MW 16

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/12/90
DATA COMPLETED: 11/12/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.64
PROTECTIVE CASING ELEVATION: 7.64
WELL ELEVATION: 7.30
WATER LEVEL: 0.33 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, VERY WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
0-2	1 11	NA	NA	Brown, fine to medium GRAVEL, damp
2-4	12 12	NA	NA	Brown, fine to medium SAND trace gravel, damp Wet at 6.0 feet
4-6	32 22	NA	NA	
6-8	12 33	NA	NA	
8-10	43 9 11	NA	NA	Brown, coarse SAND and GRAVEL, stained, wet
10-12	21 21	NA	NA	
12-14	11 11	NA	NA	Grey, fine SAND and SILT, trace shell fragments, trace wood fragments, wet
14-16	11 11	100	5.0	
16-18	1 WOH 1 WOH	100	5.0	
18-20	11 11	100	7.0	
				END OF BORING AT 20.0 feet



ATLANTIC

BORING LOG 13 MW 17

PROJECT: IR STUDY NSB – NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/12/90
DATA COMPLETED: 11/12/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.71
PROTECTIVE CASING ELEVATION: 7.71
WELL ELEVATION: 7.47
WATER LEVEL: 0.80 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN	DEPTH (FT.)	VISIUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	LEL %	RAD. (cpm)	SAMPLE ANALYSIS
					0							
0-2	2 2 3	50	0.2	Light brown, fine to medium SAND, some gravel, damp,						1	40	
2-4	3 3 4 5	75	12.0	Light brown, fine to medium SAND and GRAVEL, damp Wet at 6.0 feet.						1	40	
4-6	4 4 6 7	75	13.0		5					1	30	
6-8	5 8 6 3	95	12.0							1	40	
8-10	2 2 1 3	50	13.5	Rust brown, fine to medium SAND and GRAVEL, wet						1	40	
10-12	3 4 6 8	50	12.0	Brown, medium to coarse SAND and GRAVEL, wet	10					1	40	
12-14	6 8 7 11	75	12.0							1	40	
14-16	5 5 6 5	50	13.0	Grey, fine to medium SAND and GRAVEL, wet	15					1	40	
16-18	1 2 1 1	50	10.0							1	50	
18-20	2 1 2 3	0	NA	NO RECOVERY						NA	NA	
				AUGER TO 30.0 feet	20							

LITHOLOGY / DEPTH (FT.): 0.0, 2.0, 18.0

WELL CONSTRUCTION: 2 In. BLANK PVC; 0.01 SLOTTED PVC; 2 In. BLANK PVC; BACKFILL

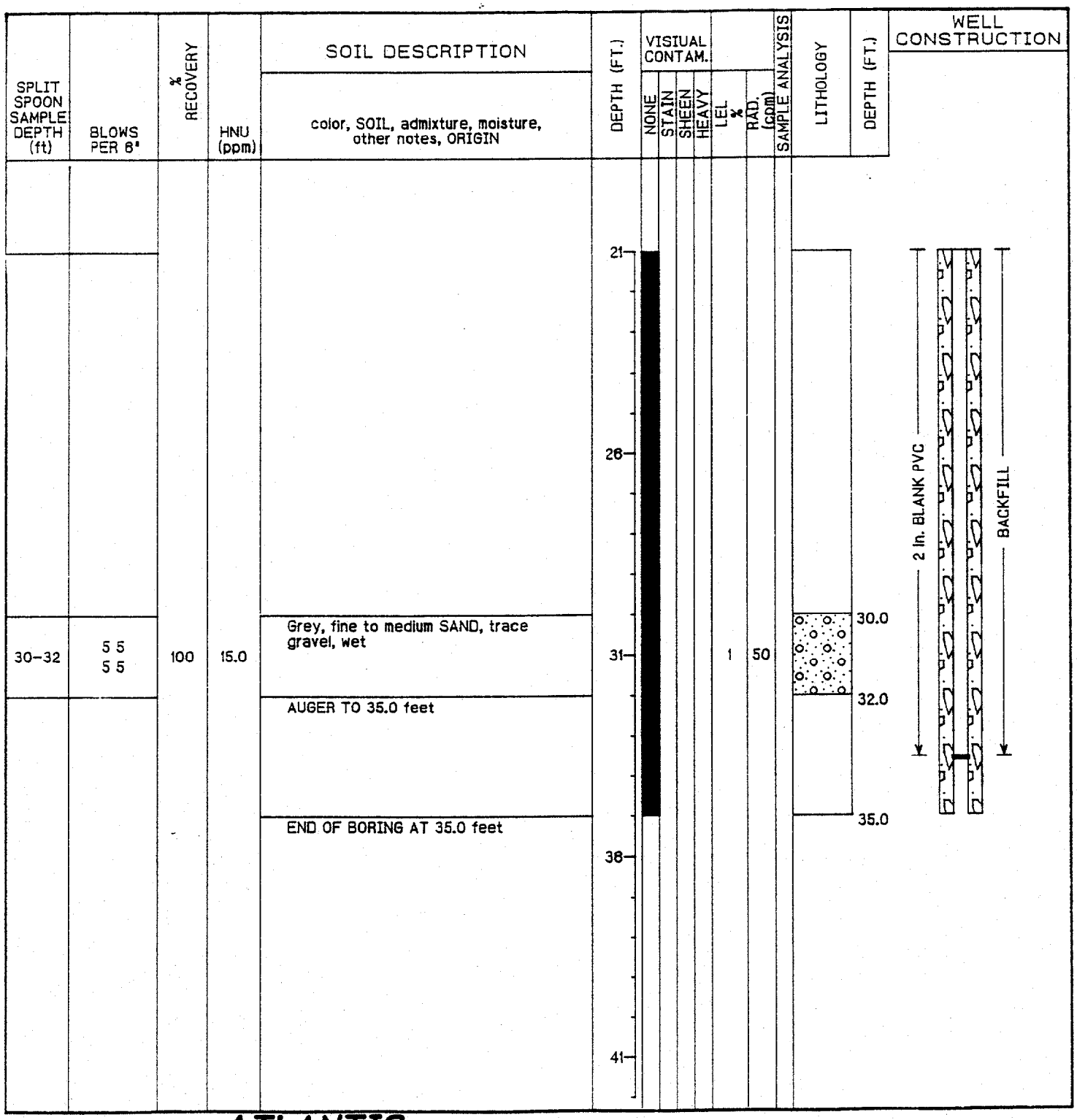
ATLANTIC

BORING LOG 13 MW 17

PROJECT: IR STUDY NSB - NLON
PROJECT NO: 1256-10
LOCATION: LOWER BASE
DATE STARTED: 11/12/90
DATA COMPLETED: 11/12/90
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS, INC.
DRILLER: TOM BROWN
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPLIT SPOON

GROUND ELEVATION: 7.71
PROTECTIVE CASING ELEVATION: 7.71
WELL ELEVATION: 7.47
WATER LEVEL: 0.80 (03/21/91)
DATUM: SUBASE
WEATHER: 45°, CLEAR SKIES, WINDY
INSPECTOR: ERIK NESS AND CURTIS NICHOLS
CHECKED BY: ERIK NESS

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION: color, SOIL, admixture, moisture, other notes, ORIGIN
30-32	5 5 5 5	100	15.0	Grey, fine to medium SAND, trace gravel, wet
				AUGER TO 35.0 feet
				END OF BORING AT 35.0 feet



HYDRAULIC CONDUCTIVITY DATA

SLUG TEST METHOD FOR UNCONFINED AQUIFERS*

REFERENCE: Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

ASSUMPTIONS:

- aquifer is unconfined
- no delayed yield in the aquifer
- aquifer has infinite areal extent
- aquifer is homogeneous and isotropic
- flow velocity is proportional to the tangent of the hydraulic gradient
- flow is horizontal and uniform in a vertical section through the axis of the well
- diameter of the well is small so that well storage can be neglected.

SOLUTION:

$$\ln h_o - \ln h_t = \frac{2 K L t}{r_c^2 \ln(r_e/r_w)}$$

where:

h_o = initial drawdown in well due to instantaneous removal of water from well [L]

h_t = drawdown in well at time t [L]

K = hydraulic conductivity [L/t]

L = length of well screen (including gravel pack) [L]

r_c = radius of well casing [L]

$$\ln(r_e/r_w) = \left[\frac{1.1}{\ln(H/rw)} + \frac{A+B\ln[(D-H)/rw]}{L/rw}\right]^{-1} \quad if\ D \neq H$$

$$\ln(r_e/r_w) = \left[\frac{1.1}{\ln(H/rw)} + \frac{C}{L/rw}\right]^{-1} \quad if\ D = H$$

A, B and C = dimensionless coefficients that are a function of L/rw and are determined from tables provided in Bouwer and Rice (1976).

SLUG TEST METHOD FOR UNCONFINED AQUIFERS
(continued)

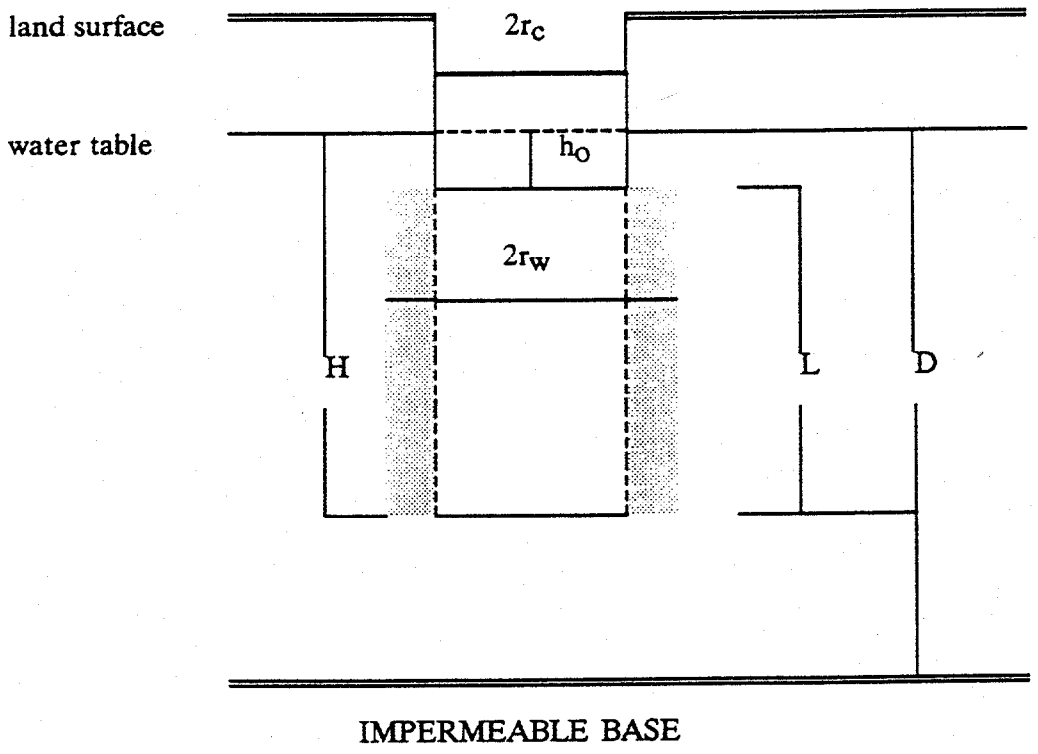
r_e = equivalent radius over which head loss occurs [L]

r_w = radius of well (including gravel pack) [L]

H = static height of water in well [L]

D = saturated thickness of aquifer

DEFINITION OF TERMS:



* This description of the Bouwer and Rice Method was extracted from Geraghty and Miller's Aqtesolv User Manual (Duffield and Rumbaugh, III, 1989).

VARIABLES USED TO ESTIMATE HYDRAULIC CONDUCTIVITY AND TRANSMISSIVITY

Well Number	Variables Measured in Feet						Remarks
	r_c	r_w	H	L	D	h_o	
			Torpedo Shops				
7MW1	0.25	0.25	36.06	11	150	0.86	Bedrock
7MW2	0.15*	0.25	6.1	9	7.91	1.19	Overburden
			Goss Cove Landfill				
8MW1S	0.15*	0.25	9.74	12	11.83	0.08	Overburden
8MW3S	0.15*	0.25	8.4	12	12.25	0.46	Overburden
8MW4S	0.15*	0.25	7.7	12	11.93	0.34	Overburden
			Area A Wetland				
2WMW3S	0.083	0.25	14.82	12	33.86	2.31	Overburden
2WMW5S	0.083	0.25	12.37	12	26.1	1.65	Overburden
2MWM1D	0.25	0.25	108	91	150	0.93	Bedrock
2WMW2D	0.25	0.25	24.45	44.93	150	2.4	Bedrock
2WMW3D	0.25	0.25	120.65	49.12	150	0.84	Bedrock
2WMW6	0.25	0.25	37.8	30.53	150	3.12	Bedrock
			Area A Landfill				
2LMW7S	0.083	0.25	12.64	12	24.46	2.43	Overburden
2LMW8S	0.083	0.25	14.9	12	19.6	1.93	Overburden
2LMW7D	0.25	0.25	39.7	10.09	150	0.85	Bedrock
2LMW18D	0.25	0.25	40.25	8.03	150	0.94	Bedrock
			Area A OBDA				
3MW12S	0.15*	0.25	12.24	12	12.9	2.75	Overburden
			Area A Downstream				
2DMW16S	0.15*	0.25	9.07	12	11.32	1.96	Overburden
2DMW10D	0.25	0.25	16.72	16.09	150	0.84	Bedrock
2DMW16D	0.25	0.25	0.9	47.41	150	0.9	Bedrock
			DRMO				
6MW2**	0.083	0.25	8.86	12	13.91	0.3	Overburden
6MW4S	0.15*	0.25	9.03	12	16.03	0.06	Overburden
6MW5S	0.15*	0.25	5.53	12	13.54	1.51	Overburden
6MW5D	0.25	0.25	22.93	9.58	150	2.57	Bedrock
			Lower Subase				
13MW6	0.15*	0.25	8.61	12	9.16	0.36	Overburden
13MW7	0.15*	0.25	9.5	12	15.51	0.45	Overburden
13MW10	0.15*	0.25	9.21	12	14.46	1.43	Overburden
13MW11	0.15*	0.25	8.7	12	15.05	1.07	Overburden
13MW12	0.15*	0.25	8.35	12	11.3	2.06	Overburden
13MW13	0.15*	0.25	8.35	12	14.29	1.55	Overburden
13MW14	0.15*	0.25	9.7	12	15.39	0.3	Overburden

NOTES

All variables are defined on a preceeding page discussing the Bouwer and Rice Method.

* – r_c value adjusted according to the following equation:

$$r_c = [r_c^2 + n(r_w^2 - r_c^2)]^{1/2}$$

n = porosity

because the water level was within the screened interval during the slug displacement test.

** – 6MW2 was analyzed using Cooper and Jacob (1946).

UNSTEADY FLOW TO A WELL IN A CONFINED AQUIFER MODIFIED METHOD

REFERENCE: Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

ASSUMPTIONS:

- aquifer has infinite areal extent
- aquifer is homogeneous, isotropic, and of uniform thickness
- aquifer water table surface is initially horizontal
- pumping rate is constant
- pumping well is fully penetrating
- aquifer is confined - can be used for unconfined aquifers if drawdown is small so that flow to pumping well is horizontal and water is released instantaneously from storage with decline of hydraulic head
- flow is unsteady
- diameter of pumping well is very small so that storage in the well can be neglected
- values of u are small (i.e., r is small and t is large)

SOLUTION:

The Cooper-Jacob method is a modification of the Theis (1935) method for confined aquifers.

$s = Q / (4 \pi T) w(u)$

where: s = drawdown [L]
Q = discharge [L^3/t]
T = Transmissivity [L^2/t]
w(u) = well function

If a graph is made where drawdown is plotted on the y-axis (linear) and time is plotted on the x-axis (logarithmic), and a best-fit straight line is fitted to the data points, transmissivity can be calculated by the following equation:

$$T = \frac{264Q}{\Delta s}$$

where: T = transmissivity [gpd/ft]
Q = discharge (gpm)
Δs = change in drawdown over one log cycle

SLUG TEST FOR CONFINED AQUIFERS *

REFERENCE: Cooper, H. H., J. D. Bredehoeft, and S. S. Papadopulos, response of a finite-diameter well to an instantaneous charge of water, Water Resources Research, vol. 3, no. 1, pp. 263-269.

ASSUMPTIONS:
aquifer has infinite areal extent
aquifer is homogeneous, isotropic, and of uniform thickness
aquifer potentiometric surface is initially horizontal
a volume of water, V, is injected into or discharged from the well instantaneously
pumping well is fully penetrating
flow to pumping well is horizontal
aquifer is confined
flow is unsteady
water is released instantaneously from storage with decline of hydraulic head
diameter of pumping well is very small so that storage in the well can be neglected

SOLUTION:

Integral solution for dimensionless drawdown in well:

$$H/H_0 = \frac{8\alpha}{\pi^2} \int_0^\infty \frac{e^{-\beta u^2/\alpha}}{u \cdot \{[uJ_0(u)-2\alpha J_1(u)]^2 + [uY_0-2\alpha Y_1(u)]^2\}}\, du$$

Laplace solution for response in well:

$$\bar{h} = \frac{r_w S H_0 K_0(rq)}{T q [r_w q K_0(r_w q) + 2\alpha K_1(r_w q)]}$$

$q = (pS/T)^{1/2}$

p = Laplace transform variable

where:

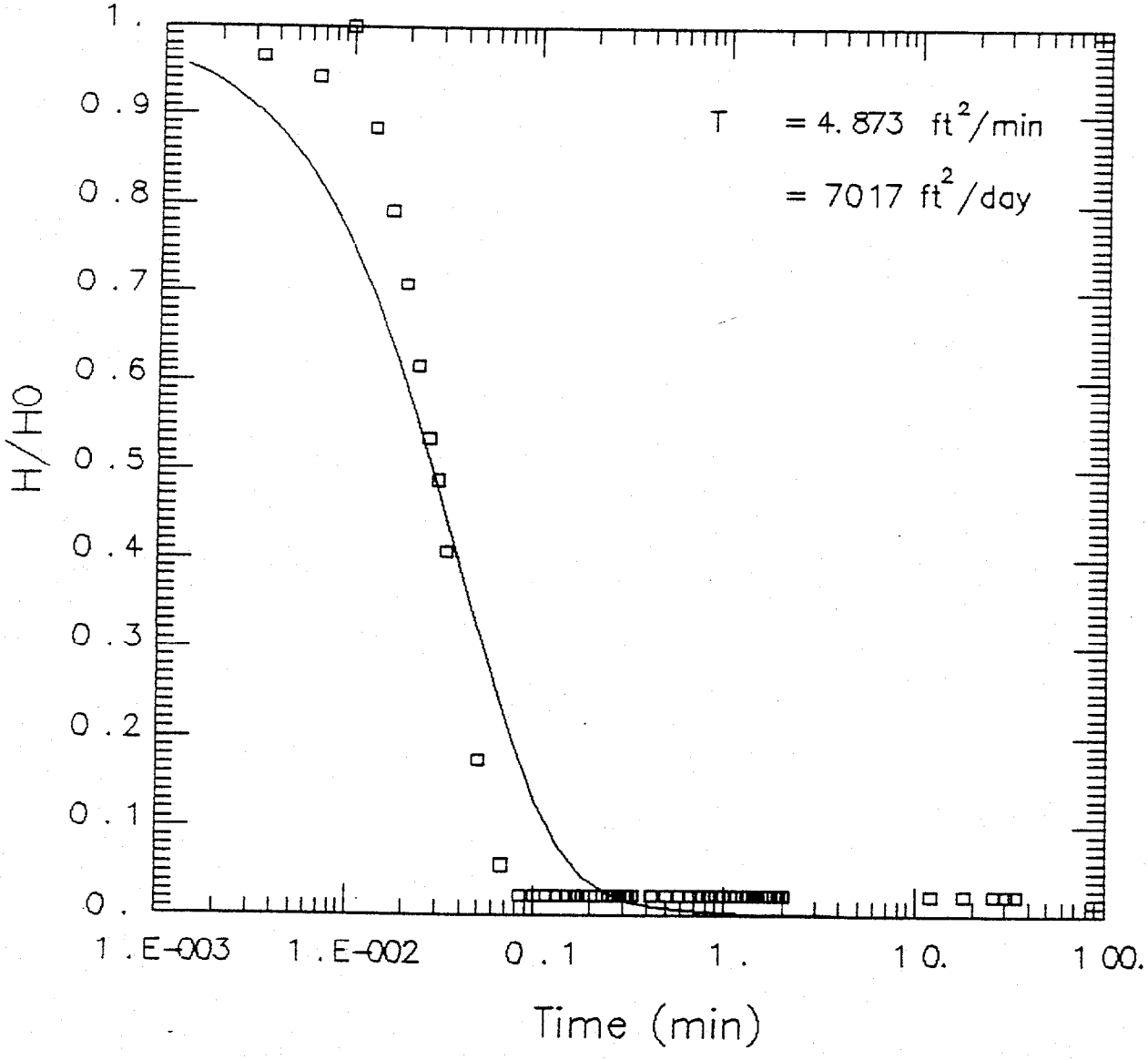
H = head in well at time t [L]

H_0 = initial head in well well due to slug injection or extraction [L]

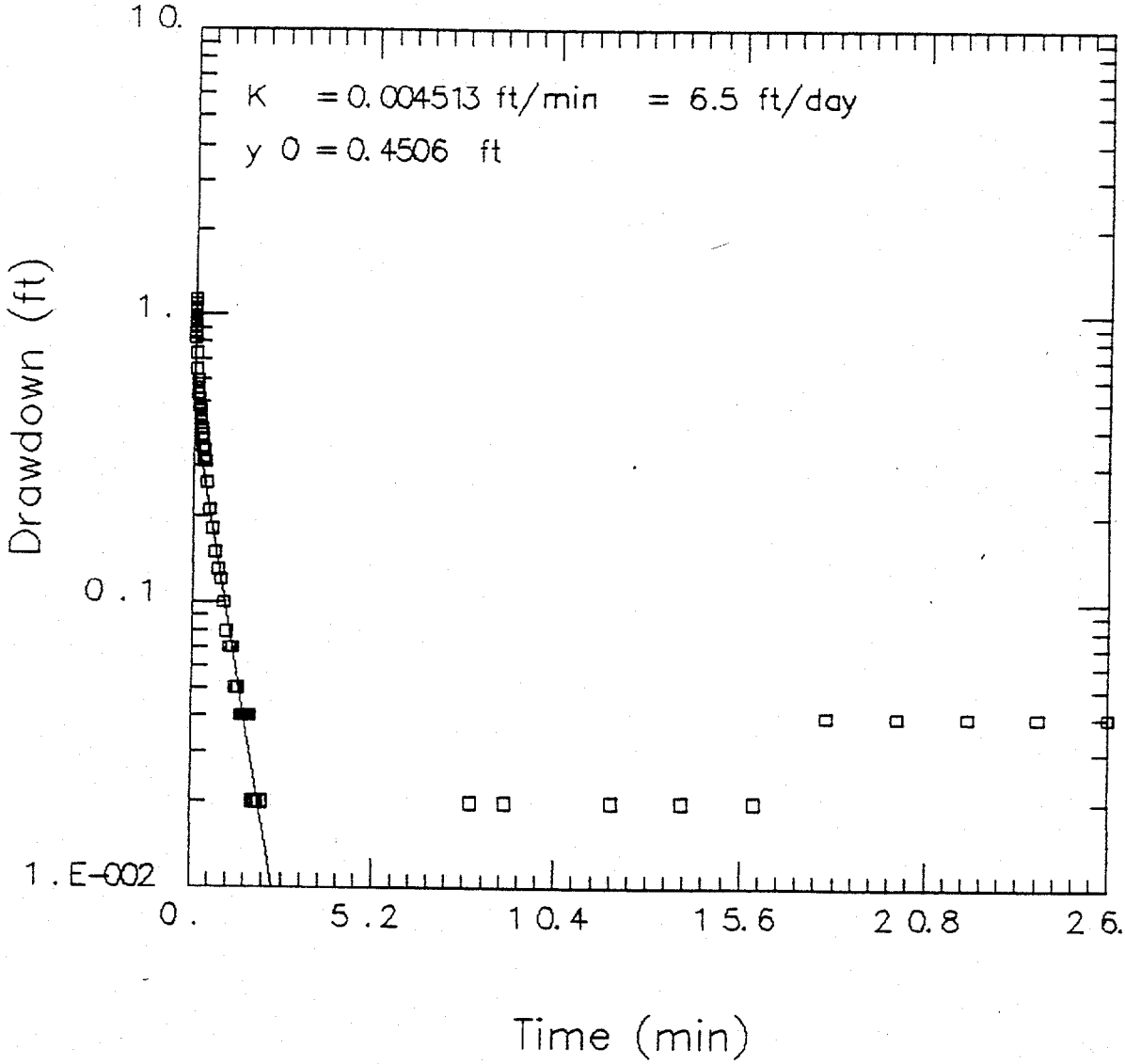
$\alpha = r_w^2 S/r_c^2$ [dimensionless]

TORPEDO SHOP

Slug Extraction Well 7-MW-1

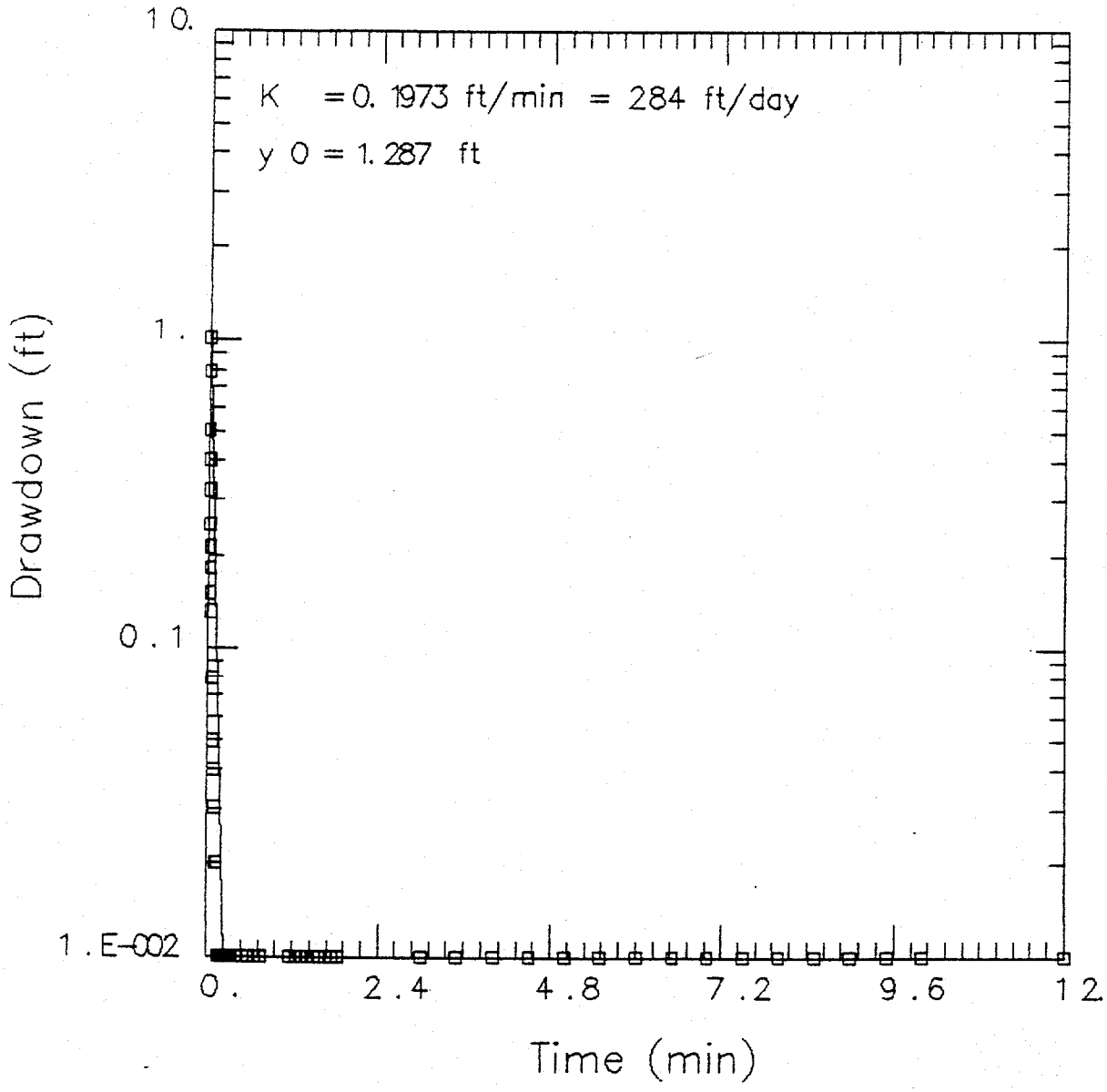


Slug Extraction Well 7-MW-2

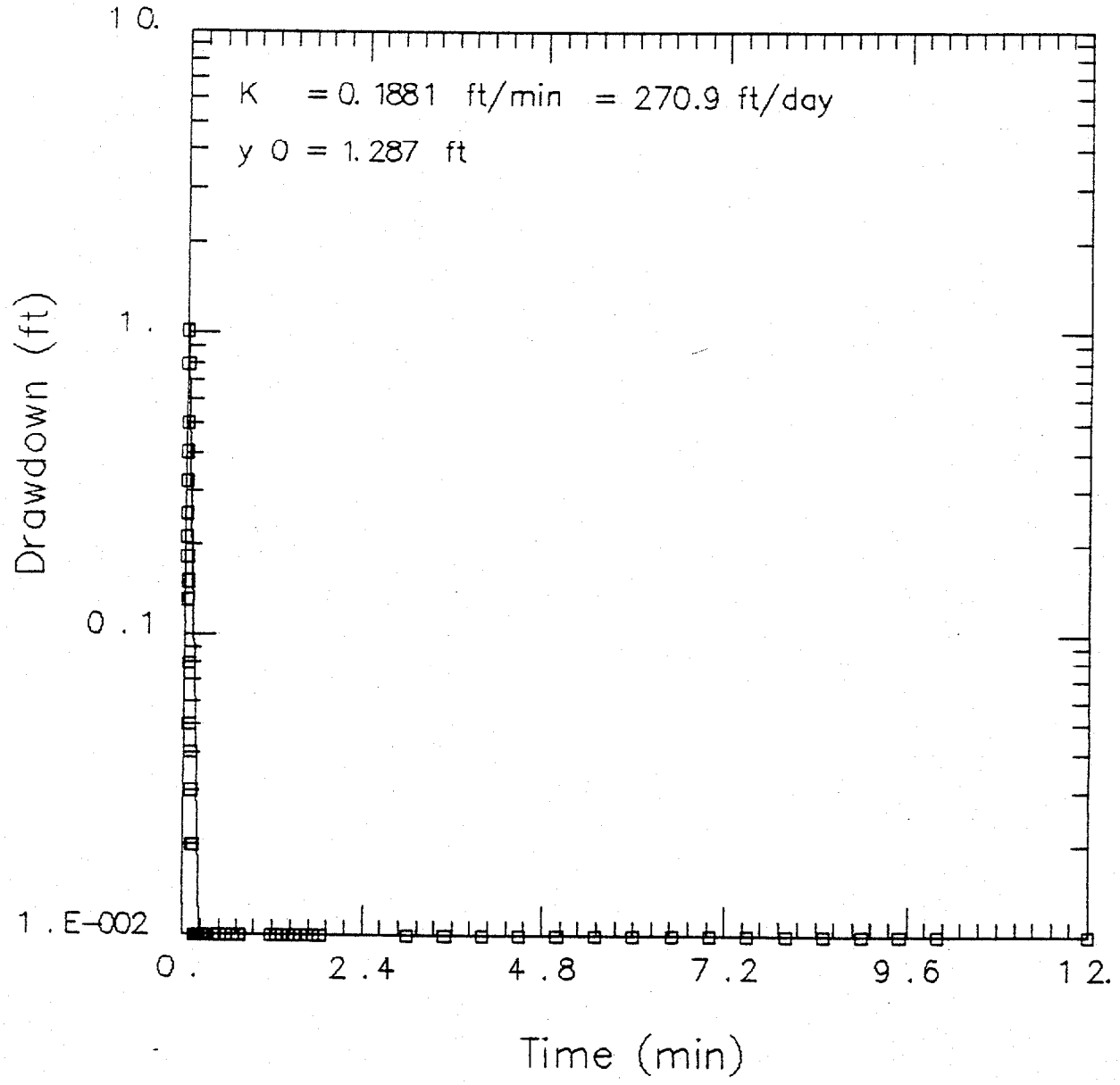


GOSS COVE LANDFILL

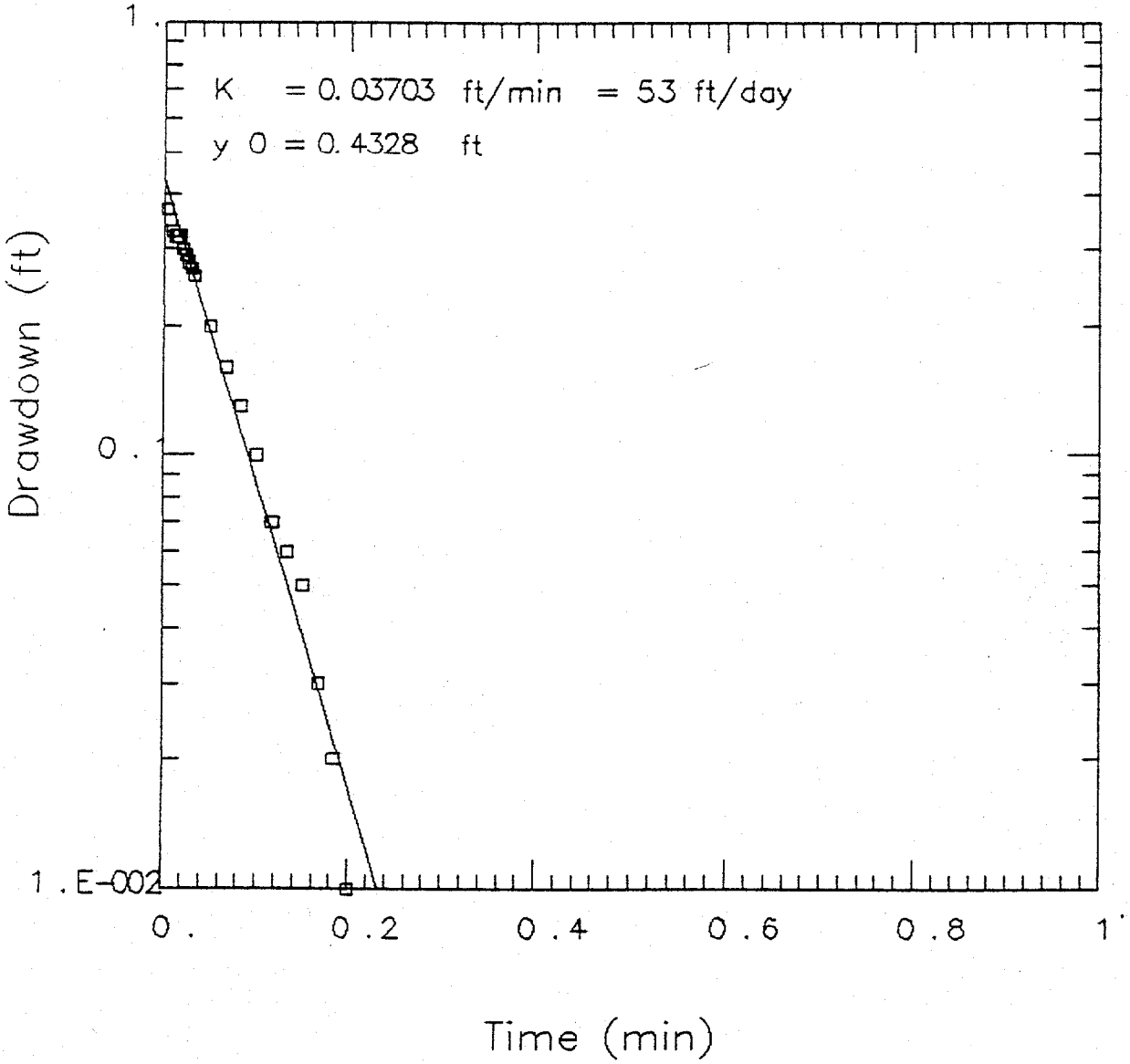
Slug Extraction Well 8-MW-1S



Slug Extraction Well 8-MW-3S

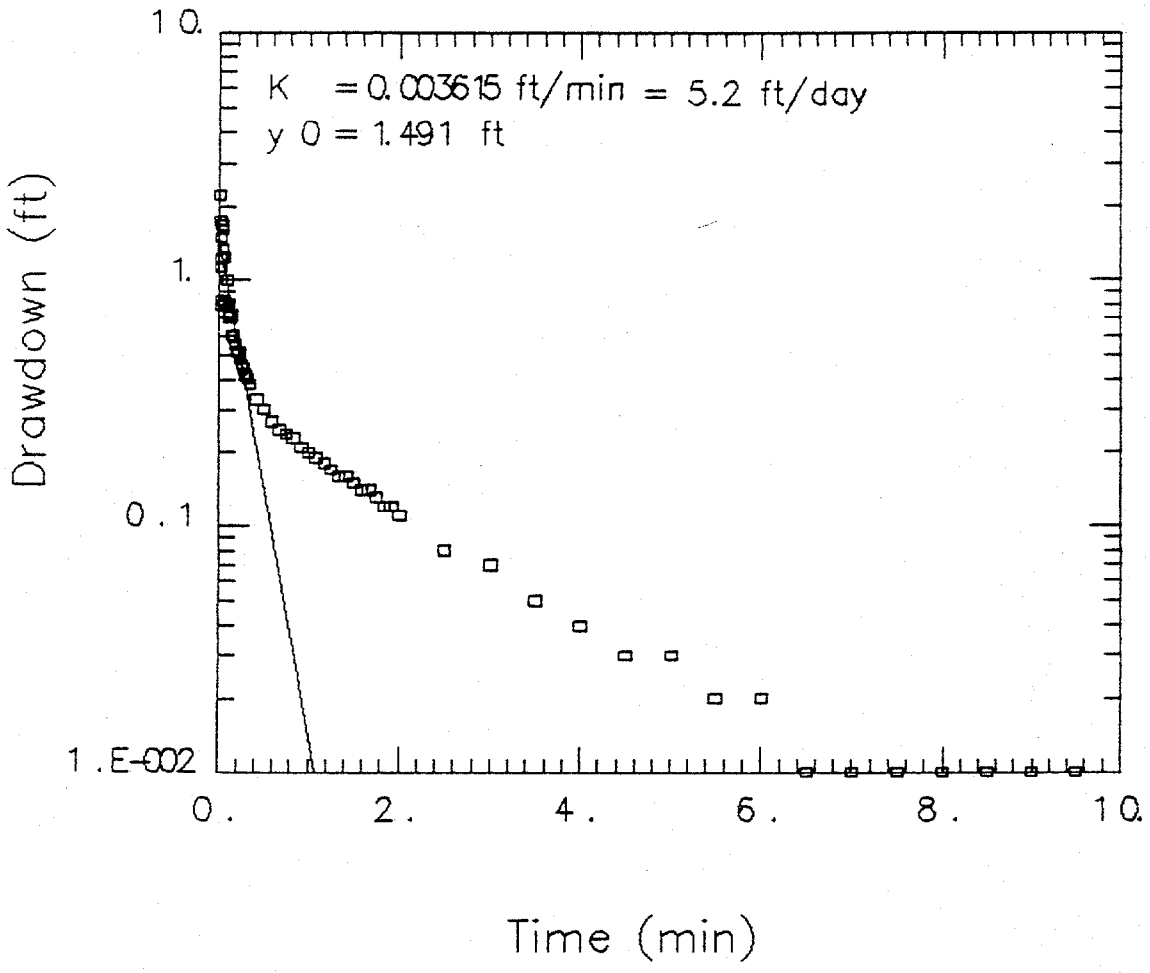


Slug Extraction Well 8-MW-4S

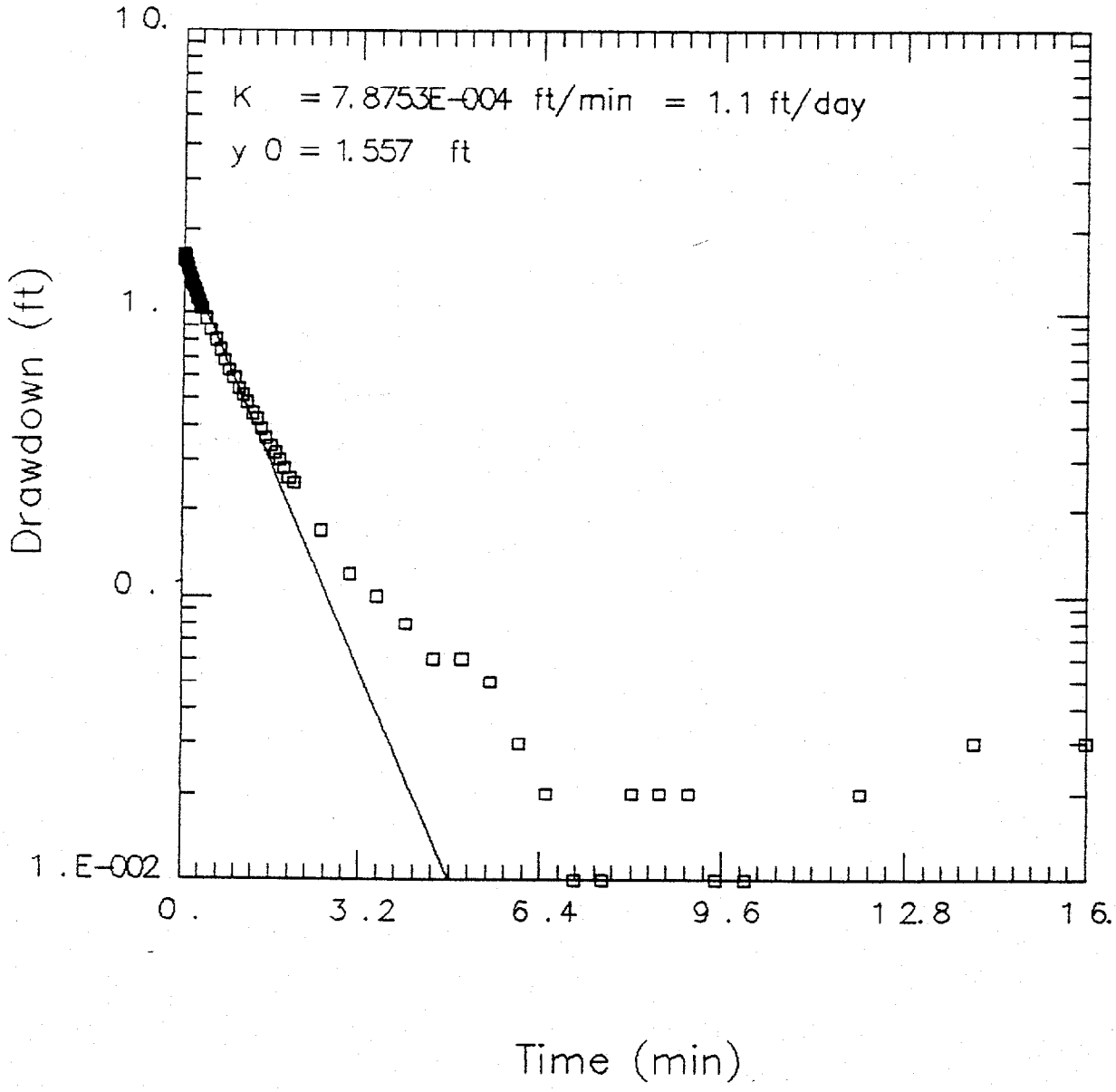


AREA A LANDFILL

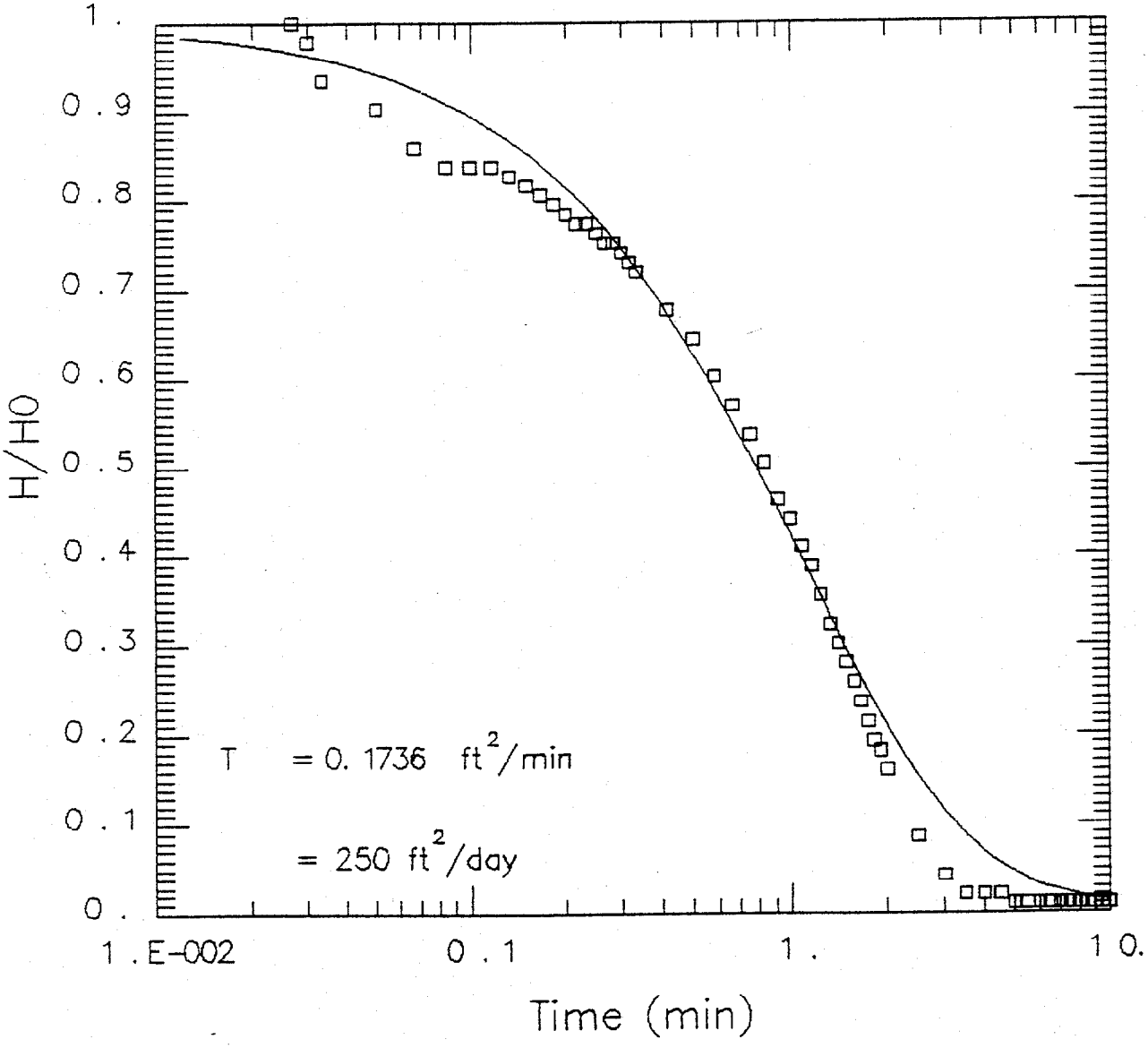
Slug Extraction Well 2W-MW-3S



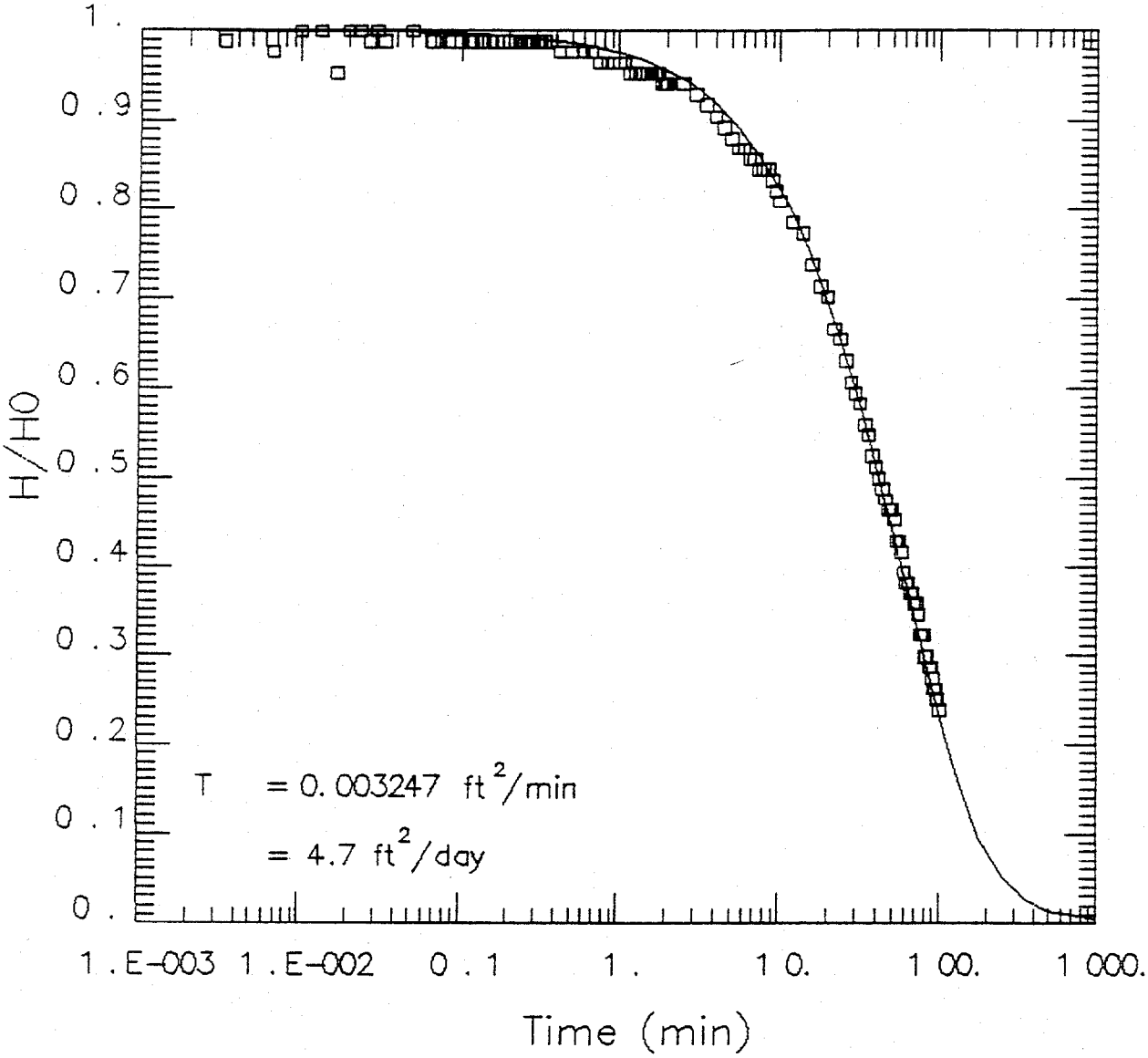
Slug Extraction Well 2W-MW-5S

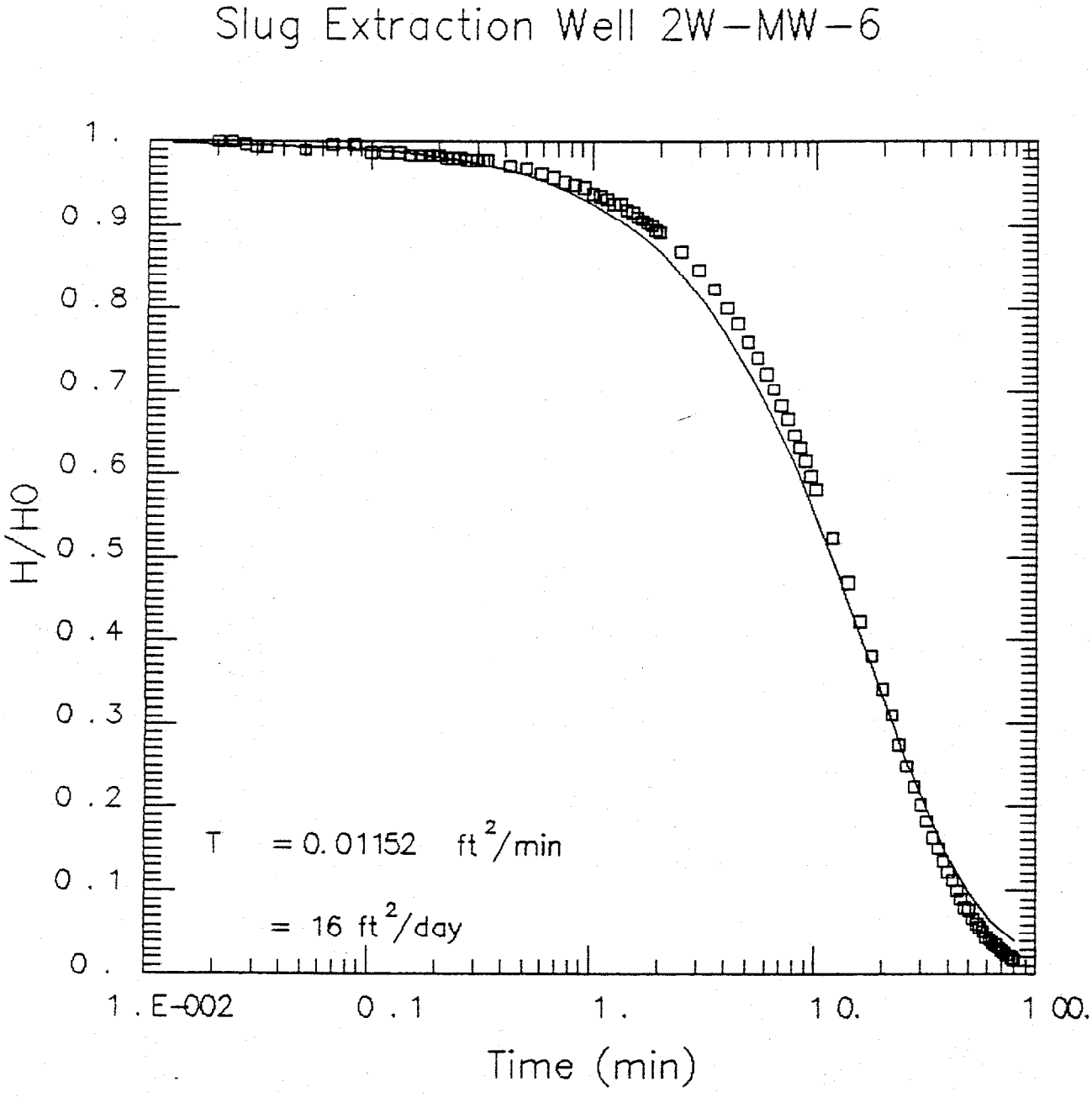


Slug Extraction Well 2W-MW-1D

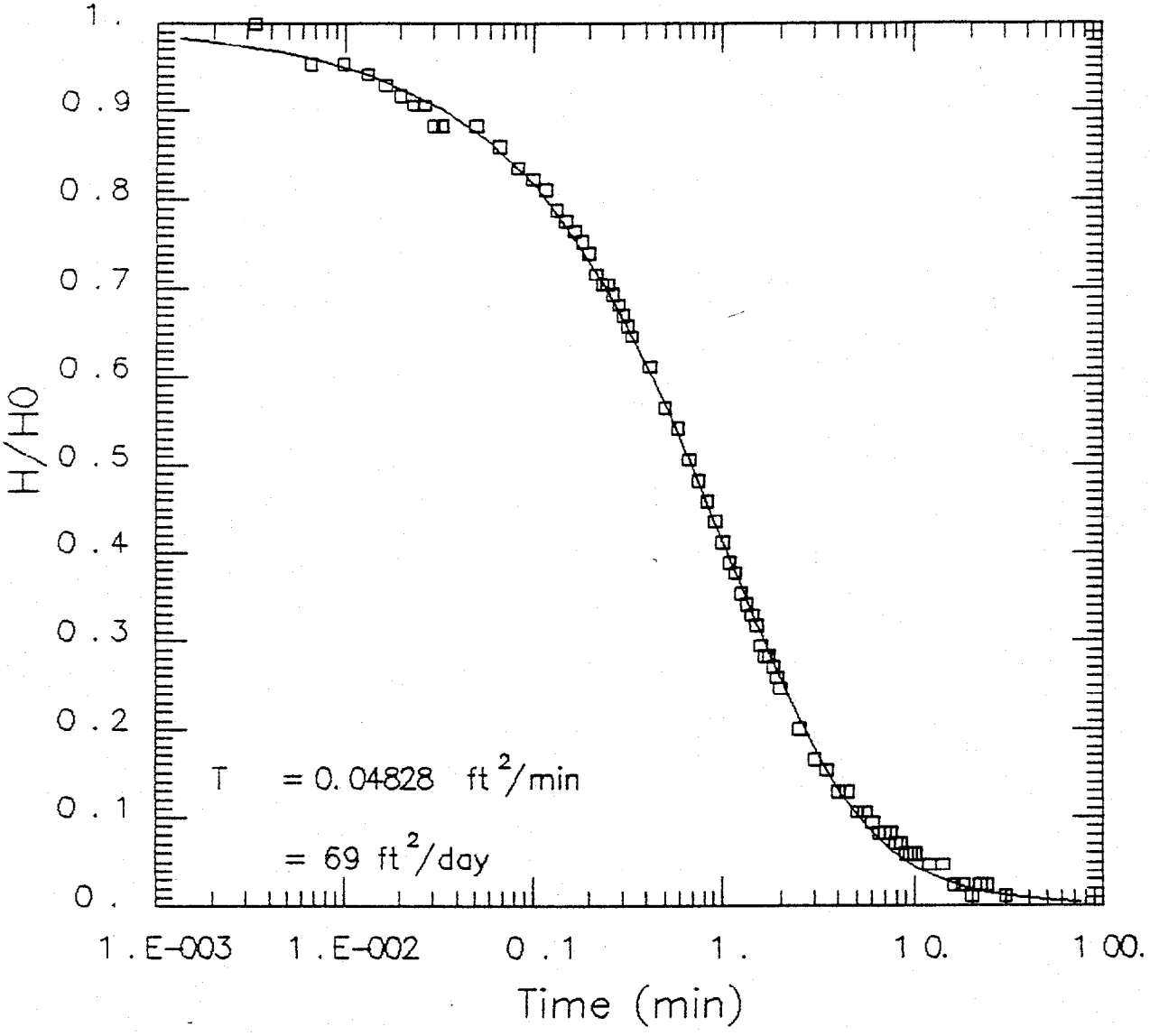


Slug Extraction Well 2W-MW-3D

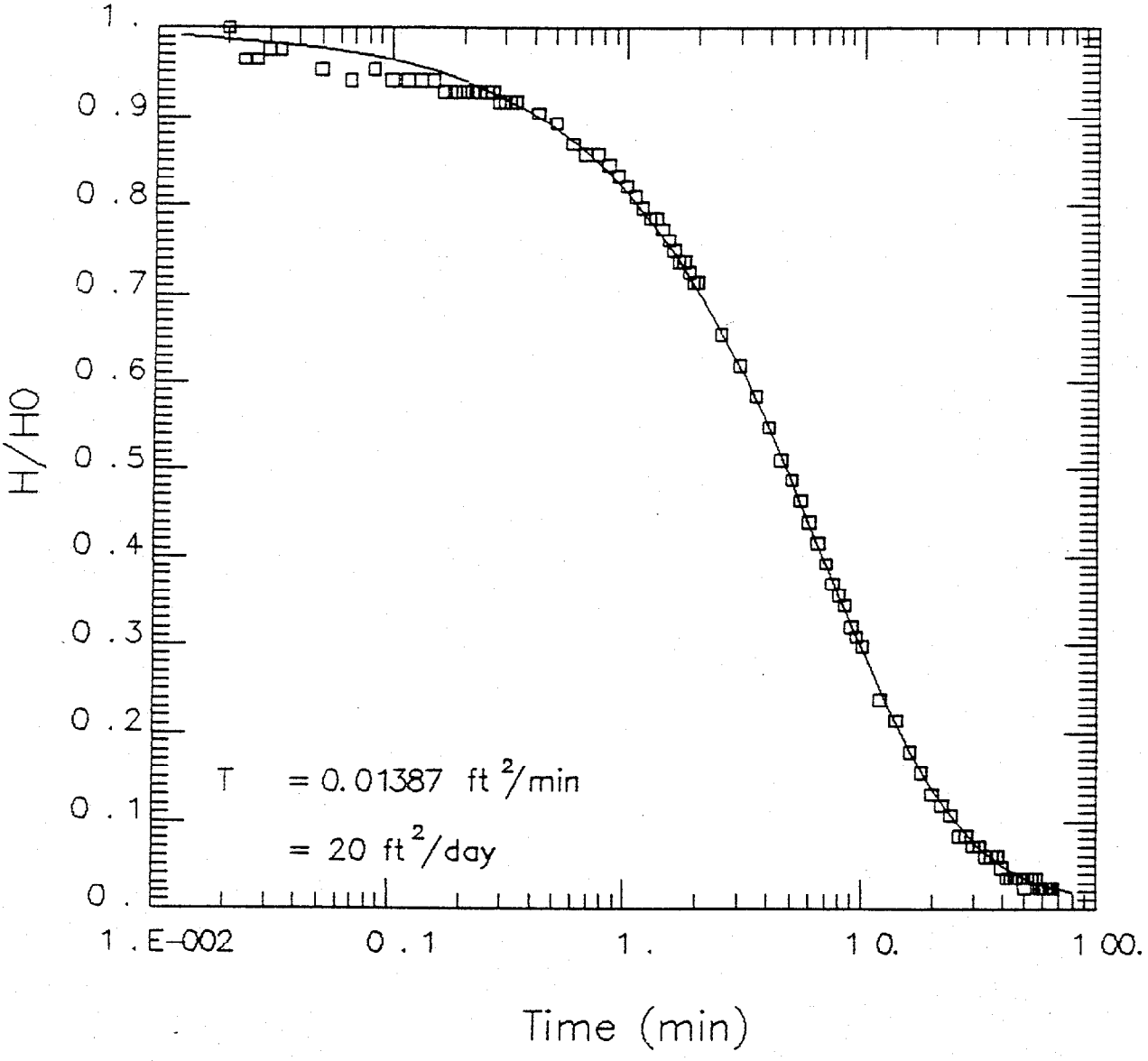



Slug Extraction Well 2W-MW-6
H/HO
1.
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.
T = 0.01152 ft²/min
= 16 ft²/day
1.E-002
0.1
1.
10.
100.
Time (min)

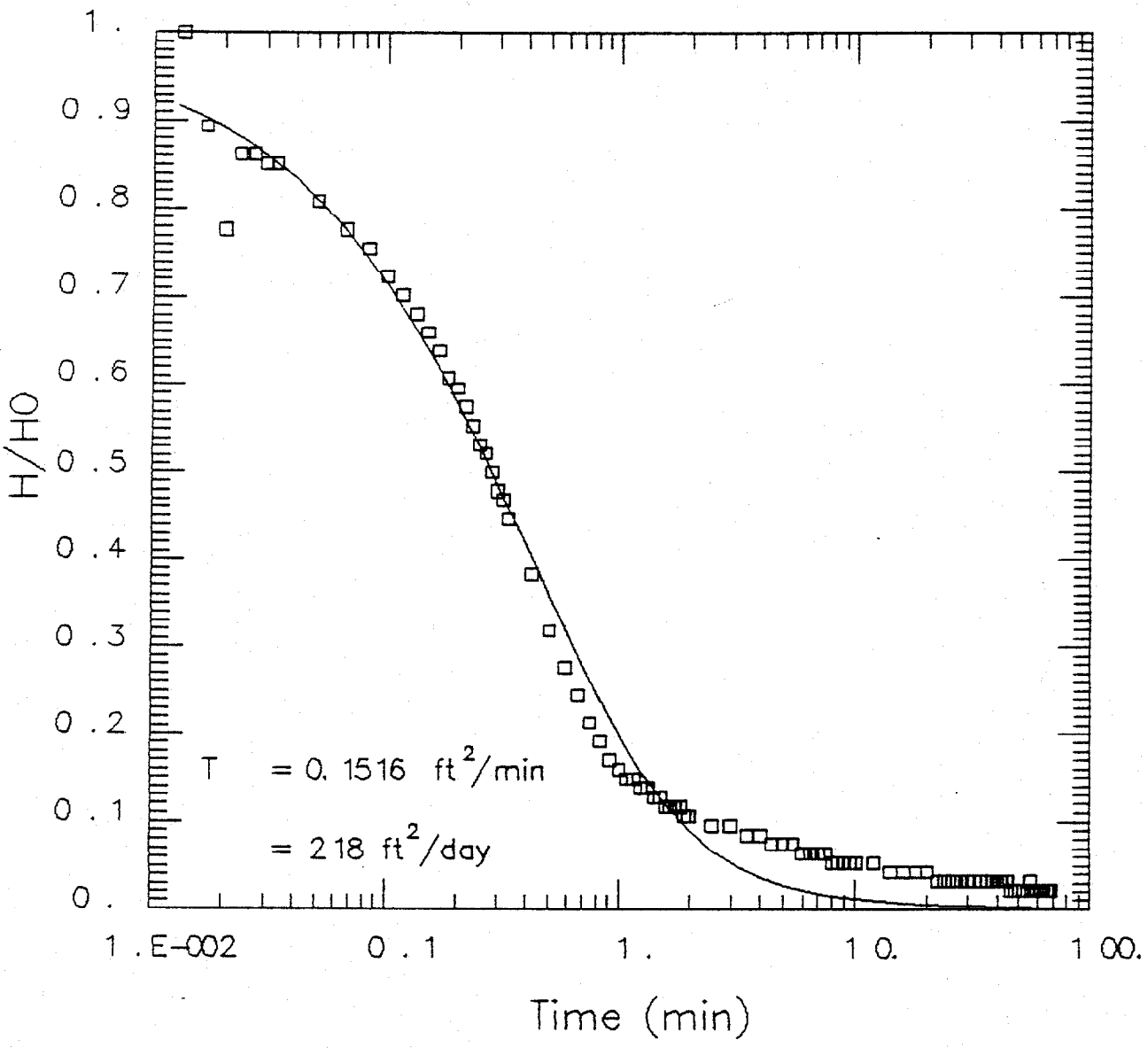
Slug Extraction Well 2L-MW-7D



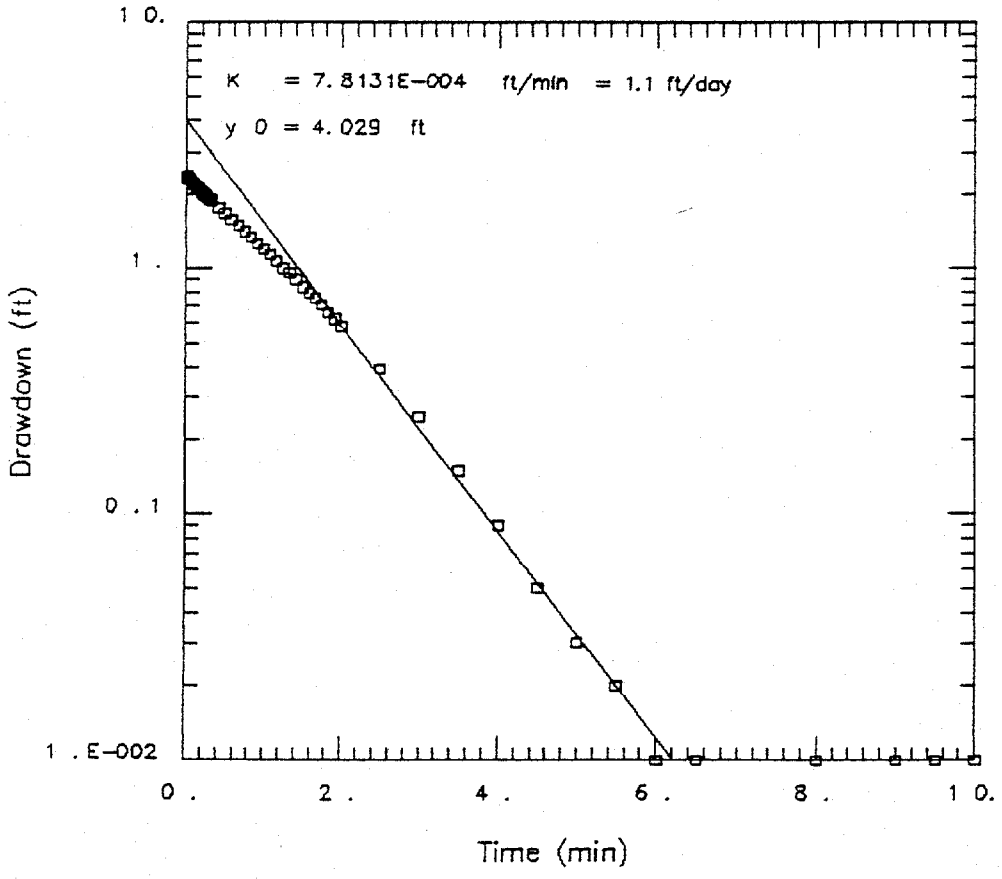
Slug Extraction Well 2D-MW-10D



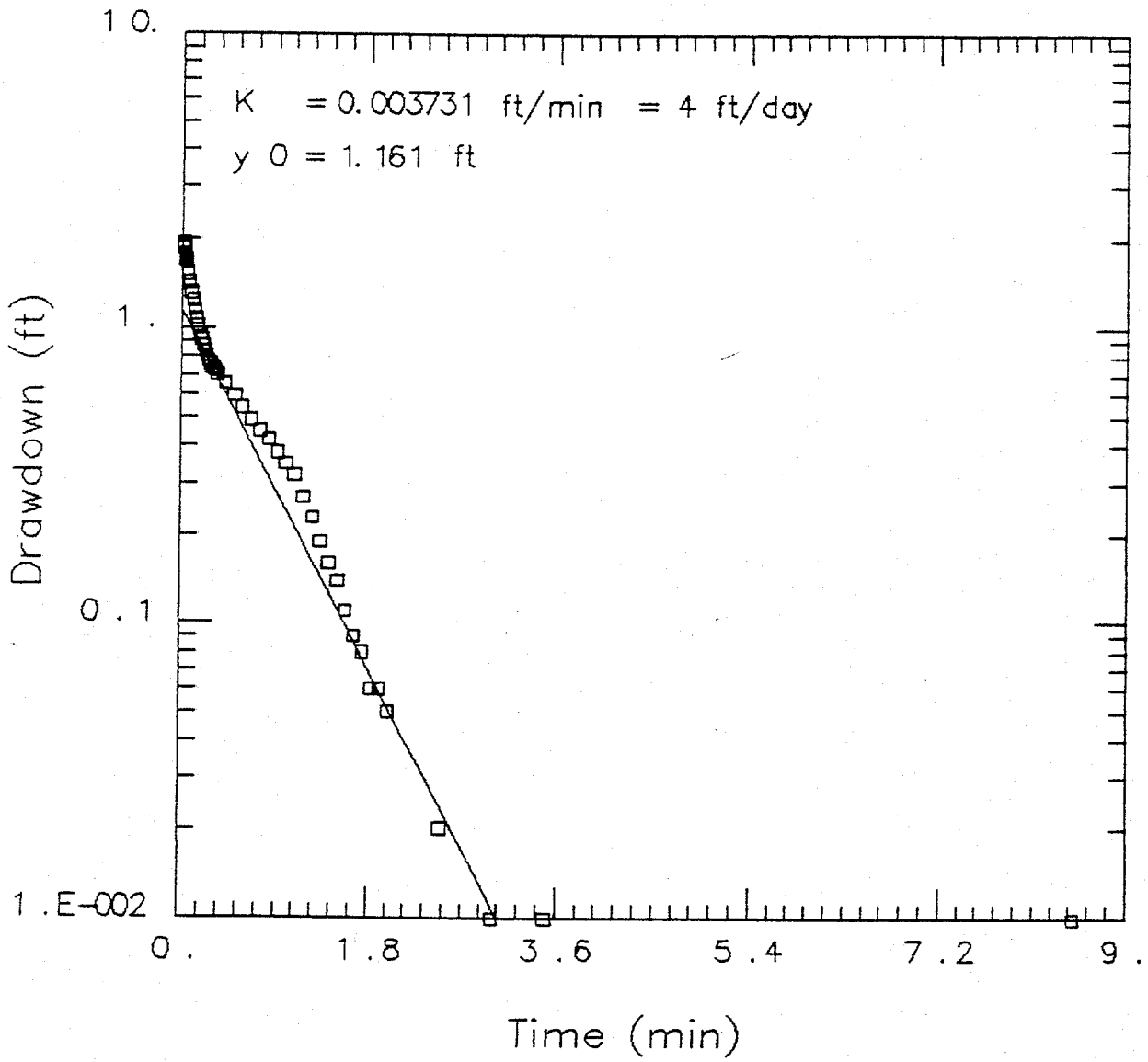
Slug Extraction Well 2L-MW-18D



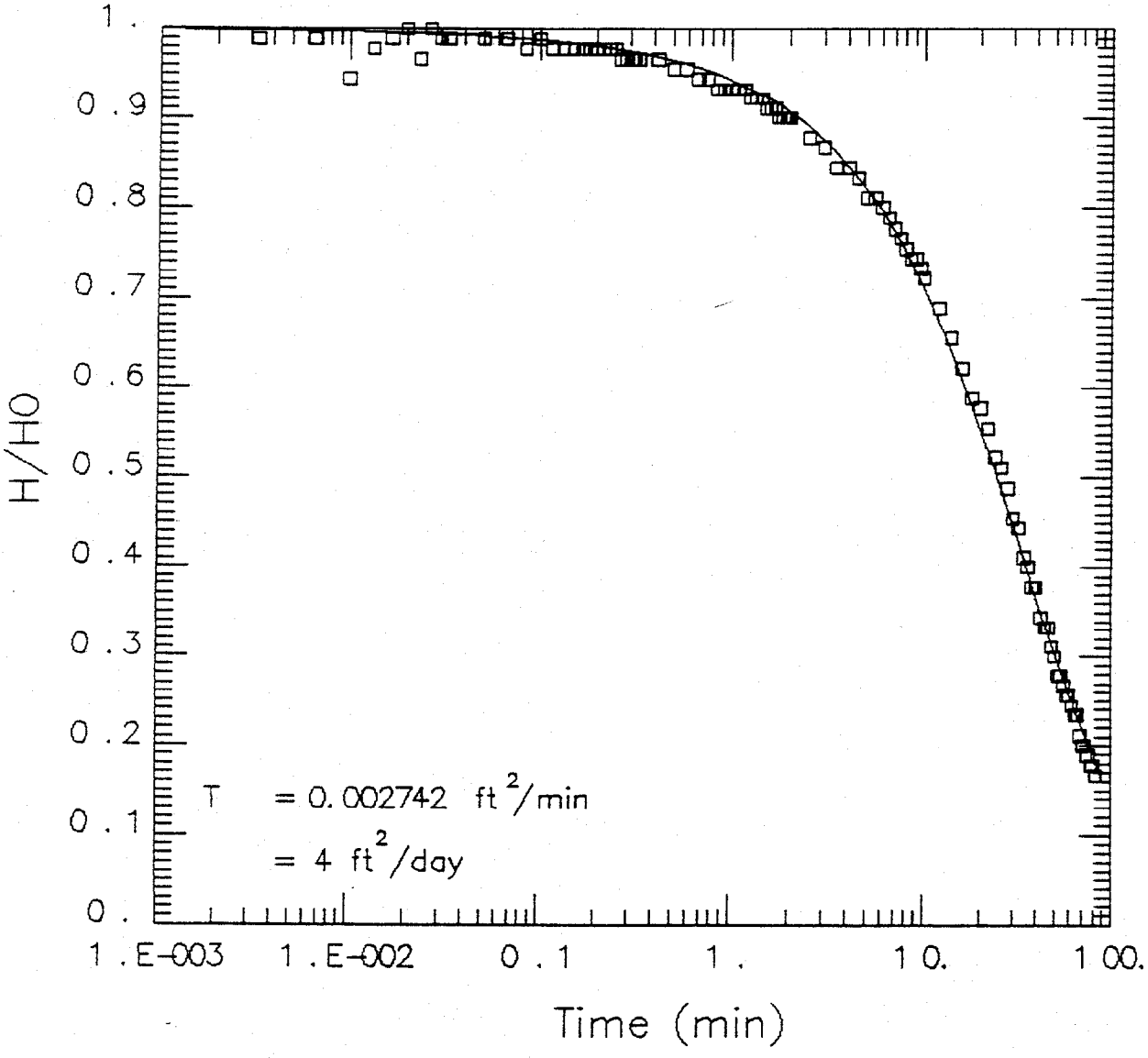
Slug Extraction Well 3-MW-12S



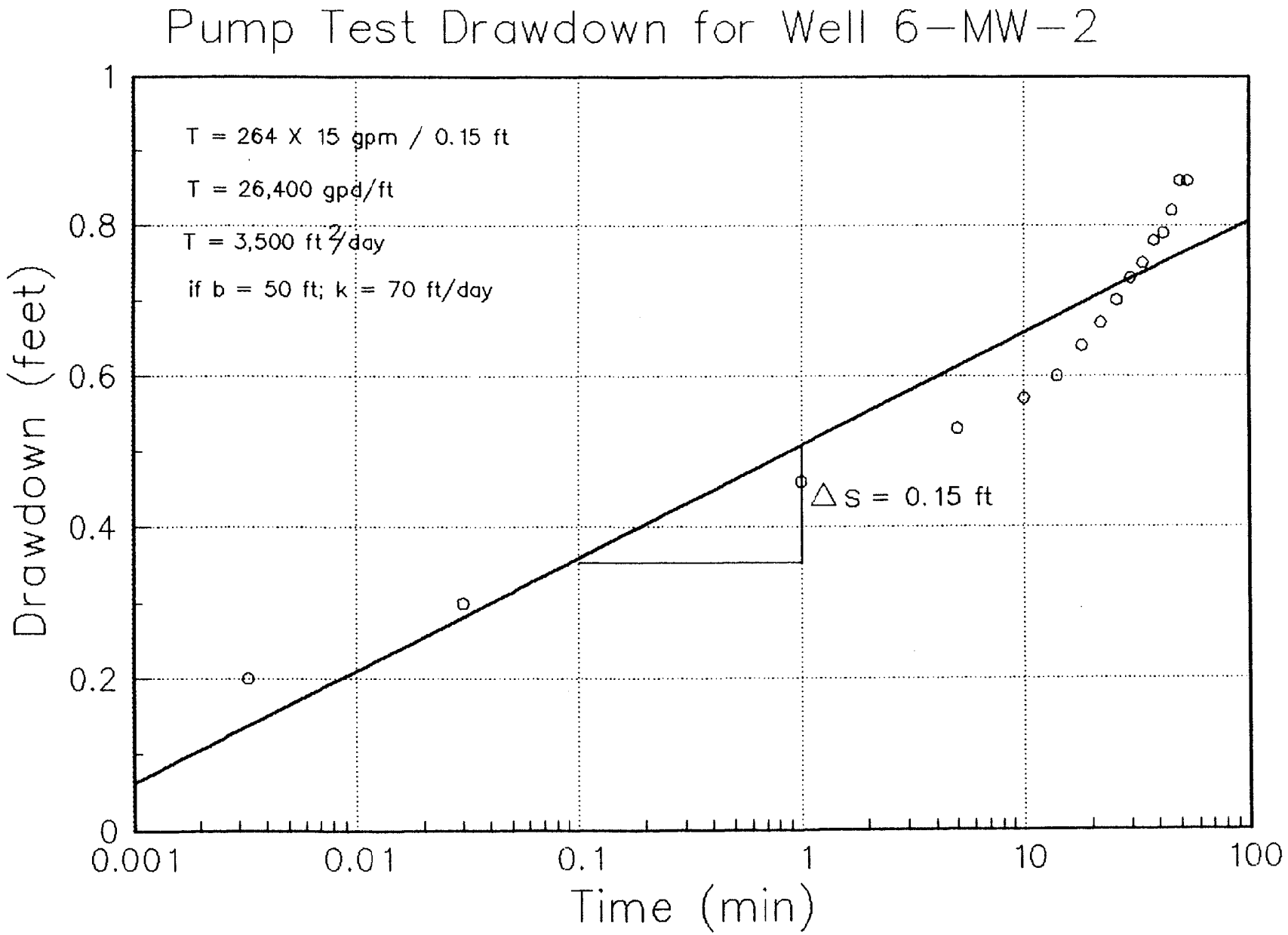
Slug Extraction Well 2D-MW-16S

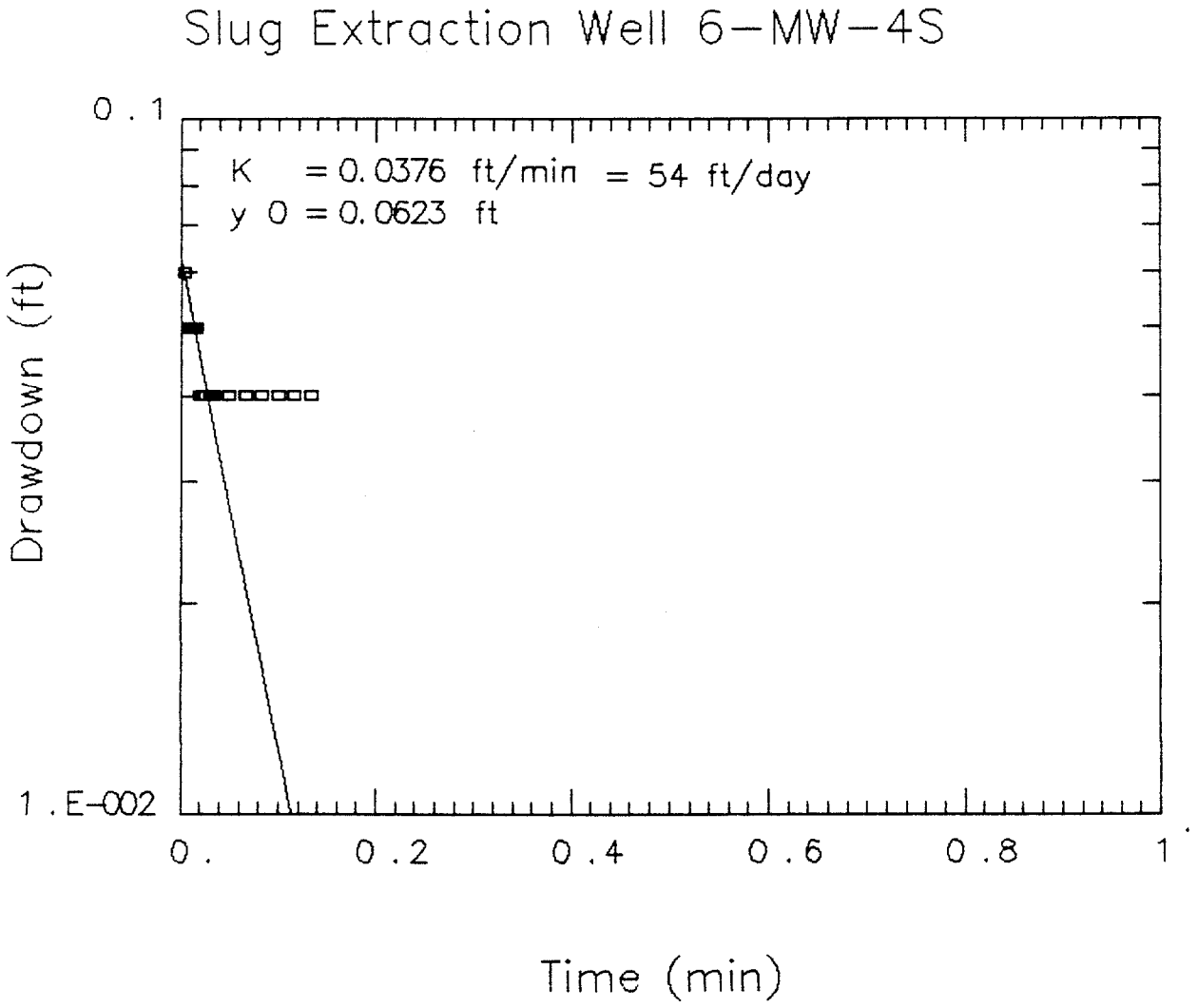


Slug Extraction Well 2D-MW-16D

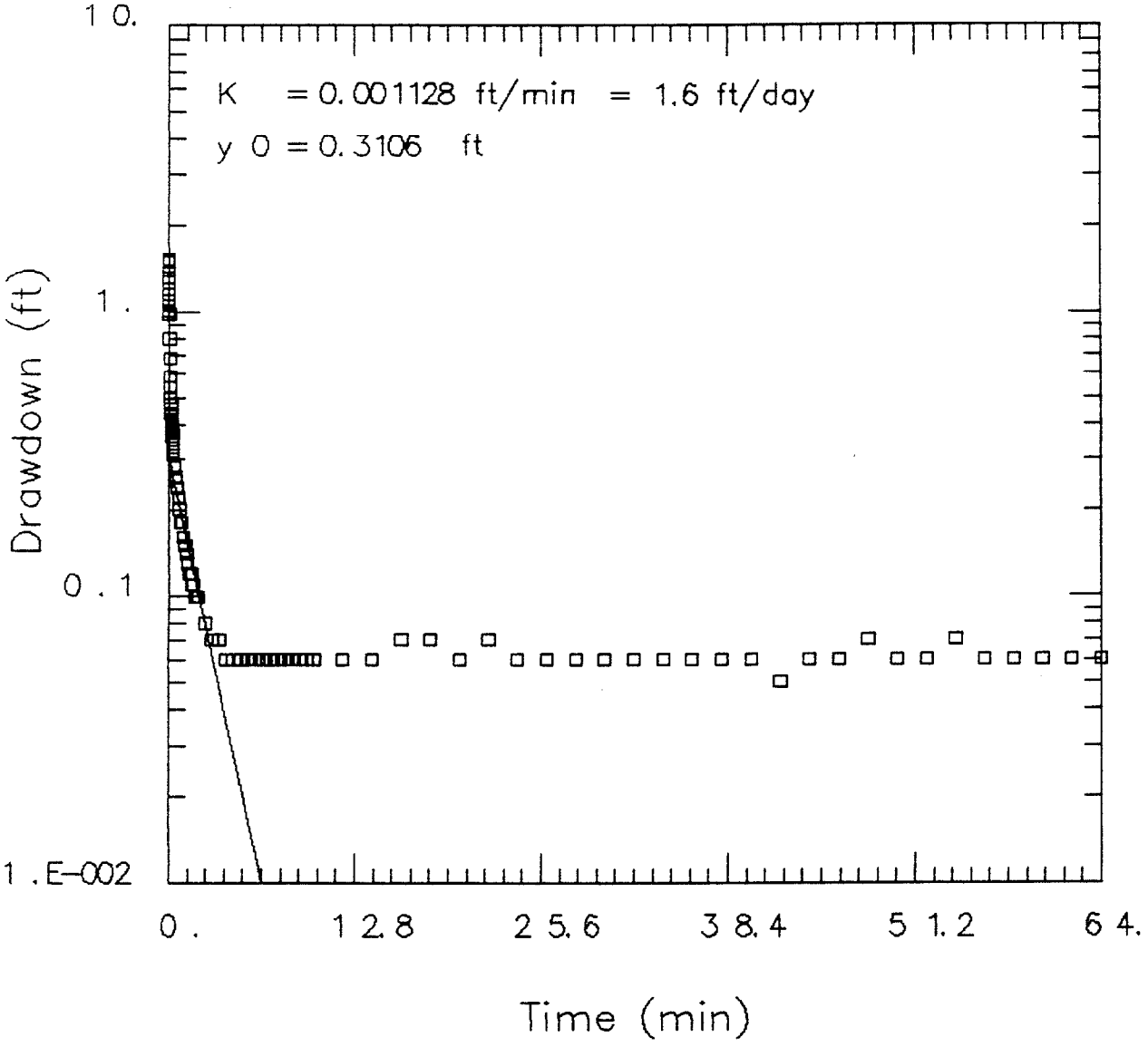


DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)

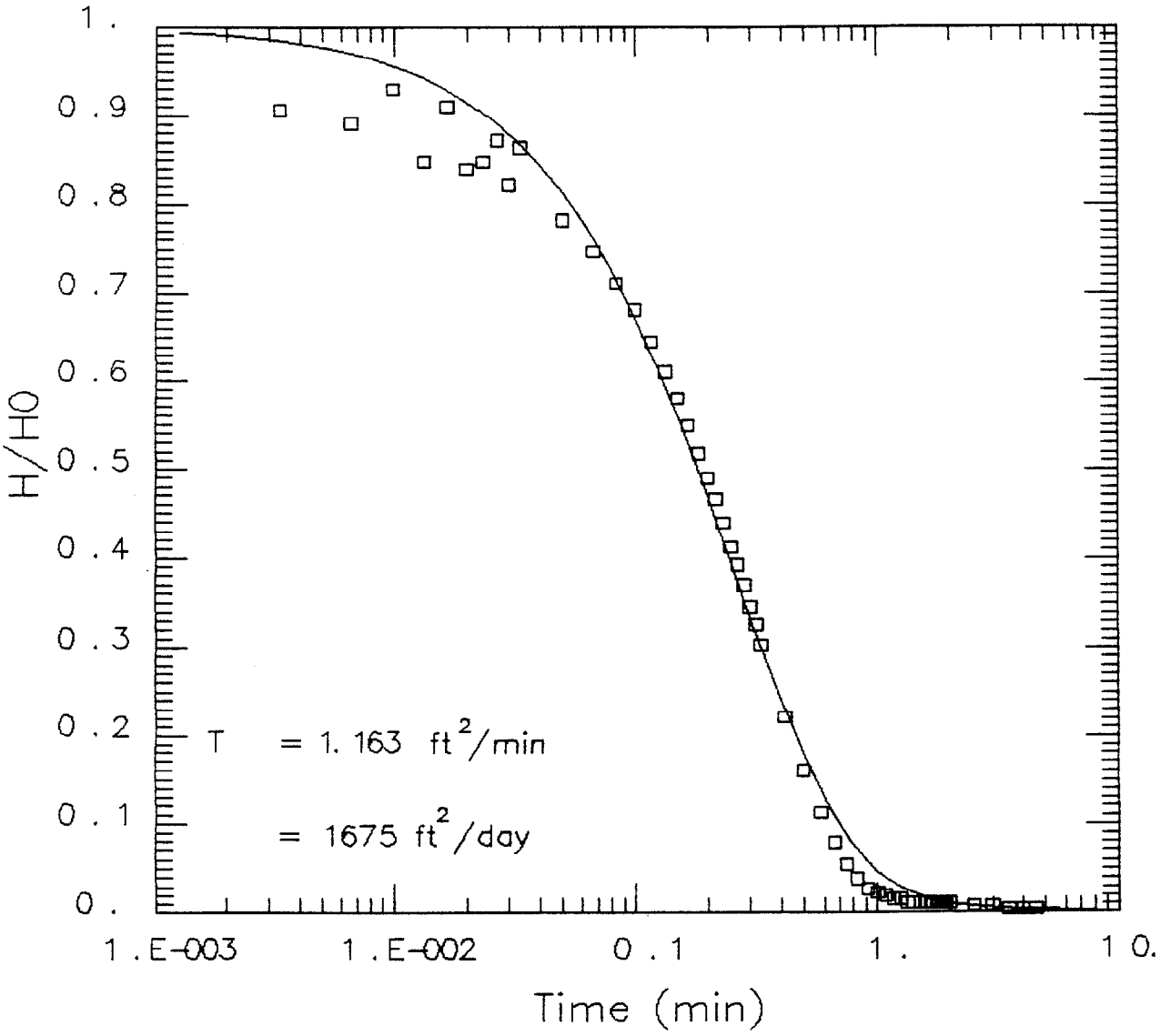

Pump Test Drawdown for Well 6-MW-2
T = 264 X 15 gpm / 0.15 ft
T = 26,400 gpd/ft
T = 3,500 ft²/day
if b = 50 ft; k = 70 ft/day
Δs = 0.15 ft
Drawdown (feet)
Time (min)
0
0.2
0.4
0.6
0.8
1
0.001
0.01
0.1
1
10
100


Slug Extraction Well 6-MW-4S
0.1
1.E-002
K = 0.0376 ft/min = 54 ft/day
y 0 = 0.0623 ft
Drawdown (ft)
0.
0.2
0.4
0.6
0.8
1
Time (min)

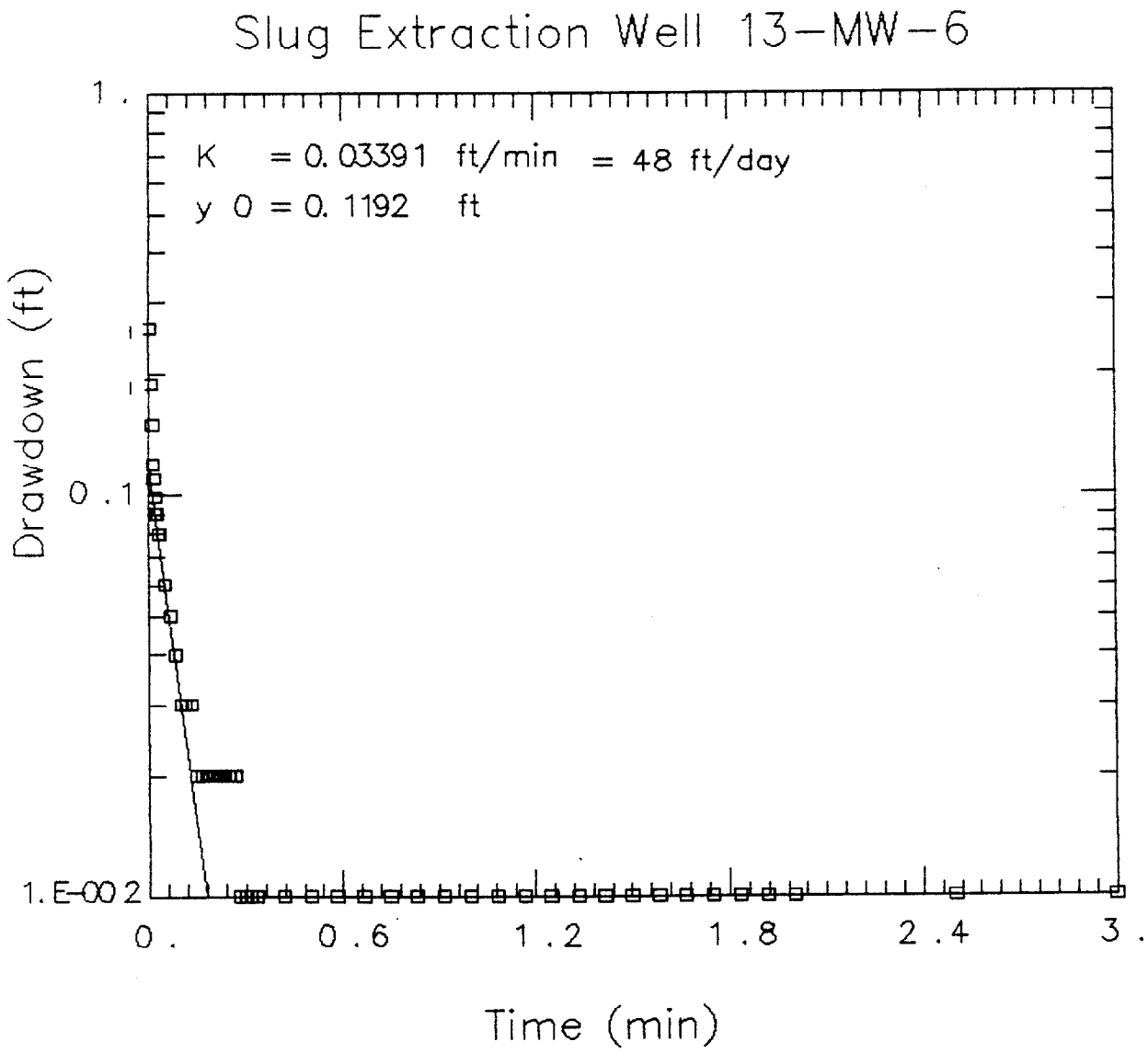
Slug Extraction Well 6 –MW–5S

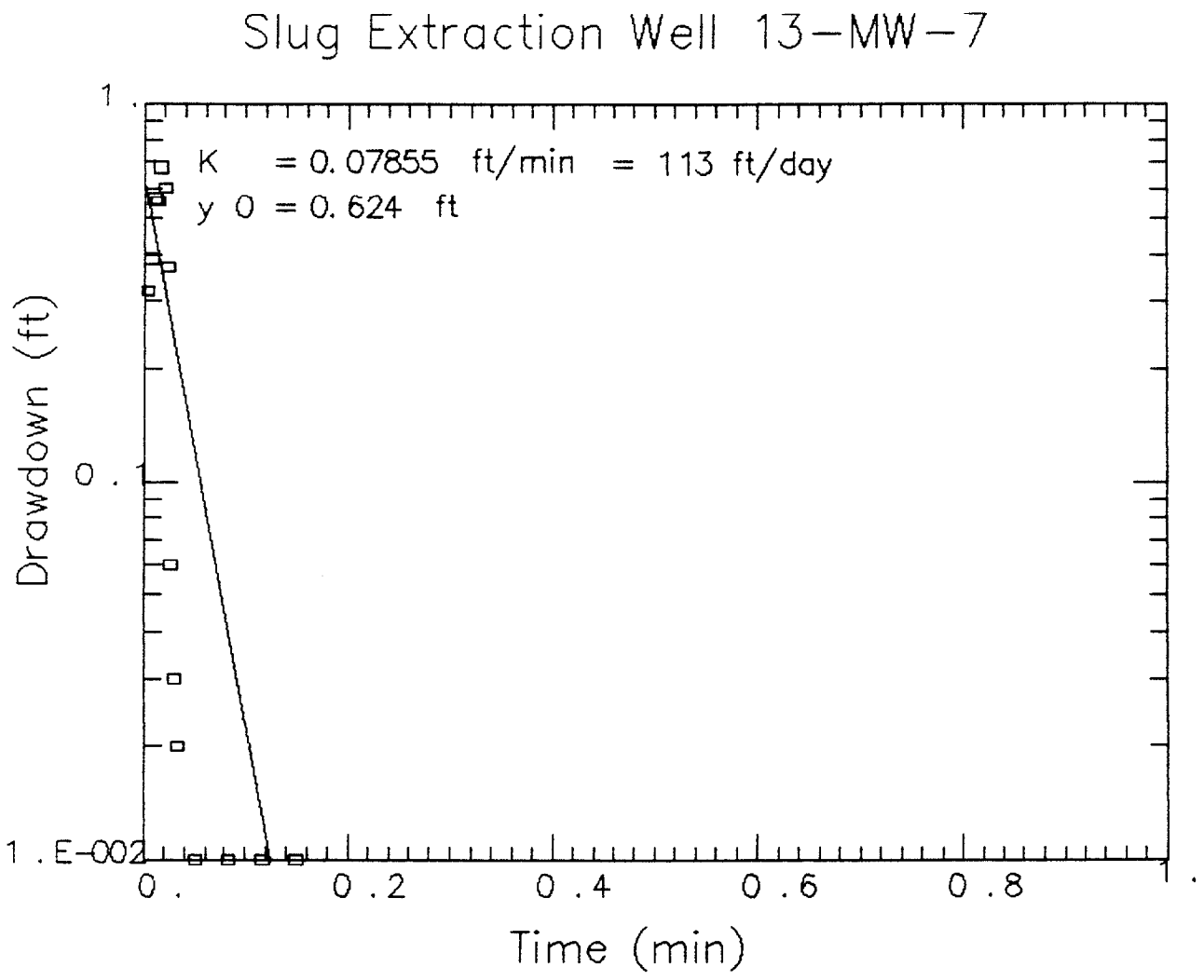


Recovery Data for Well 6-MW-5D

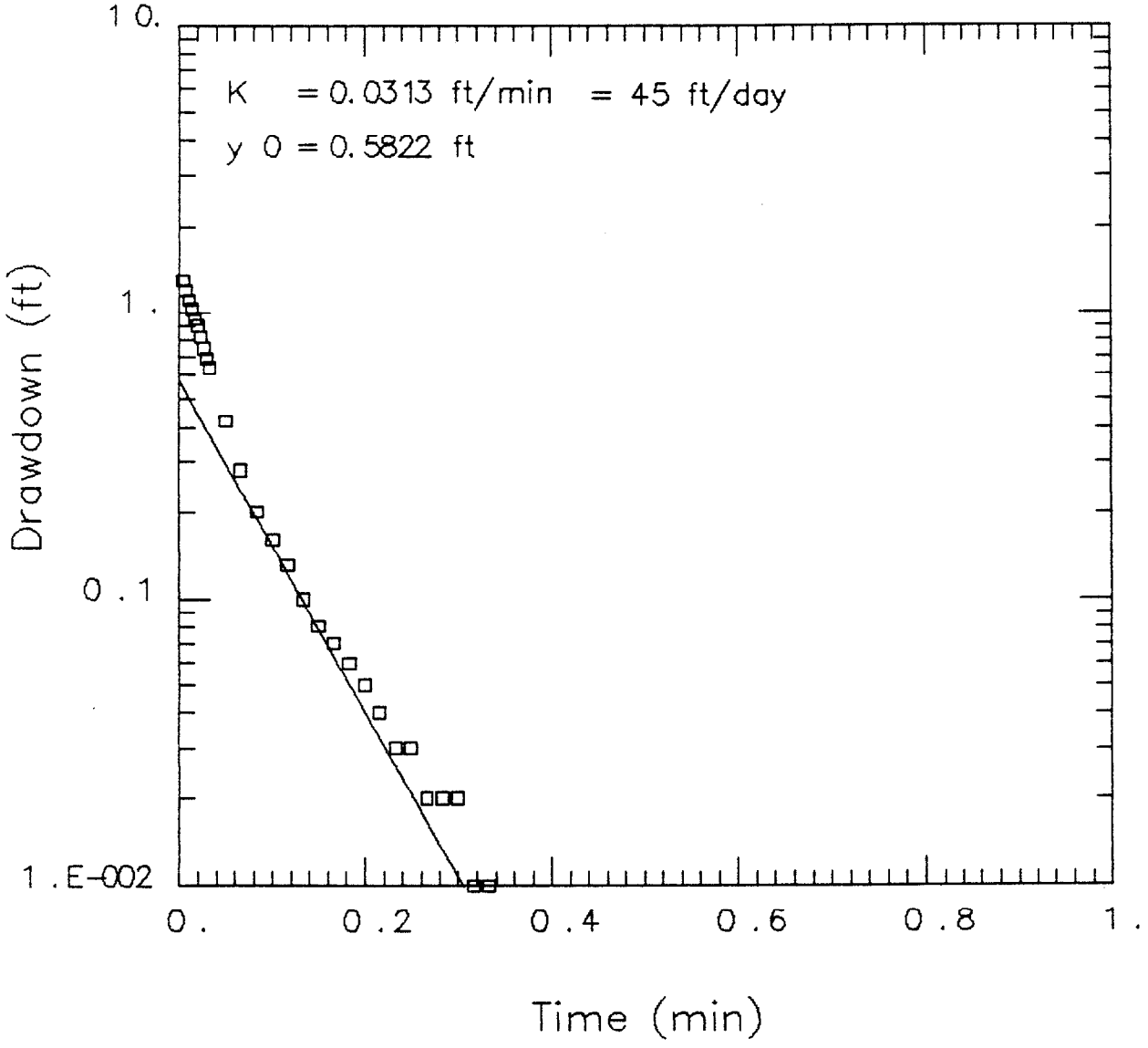


LOWER SUBASE

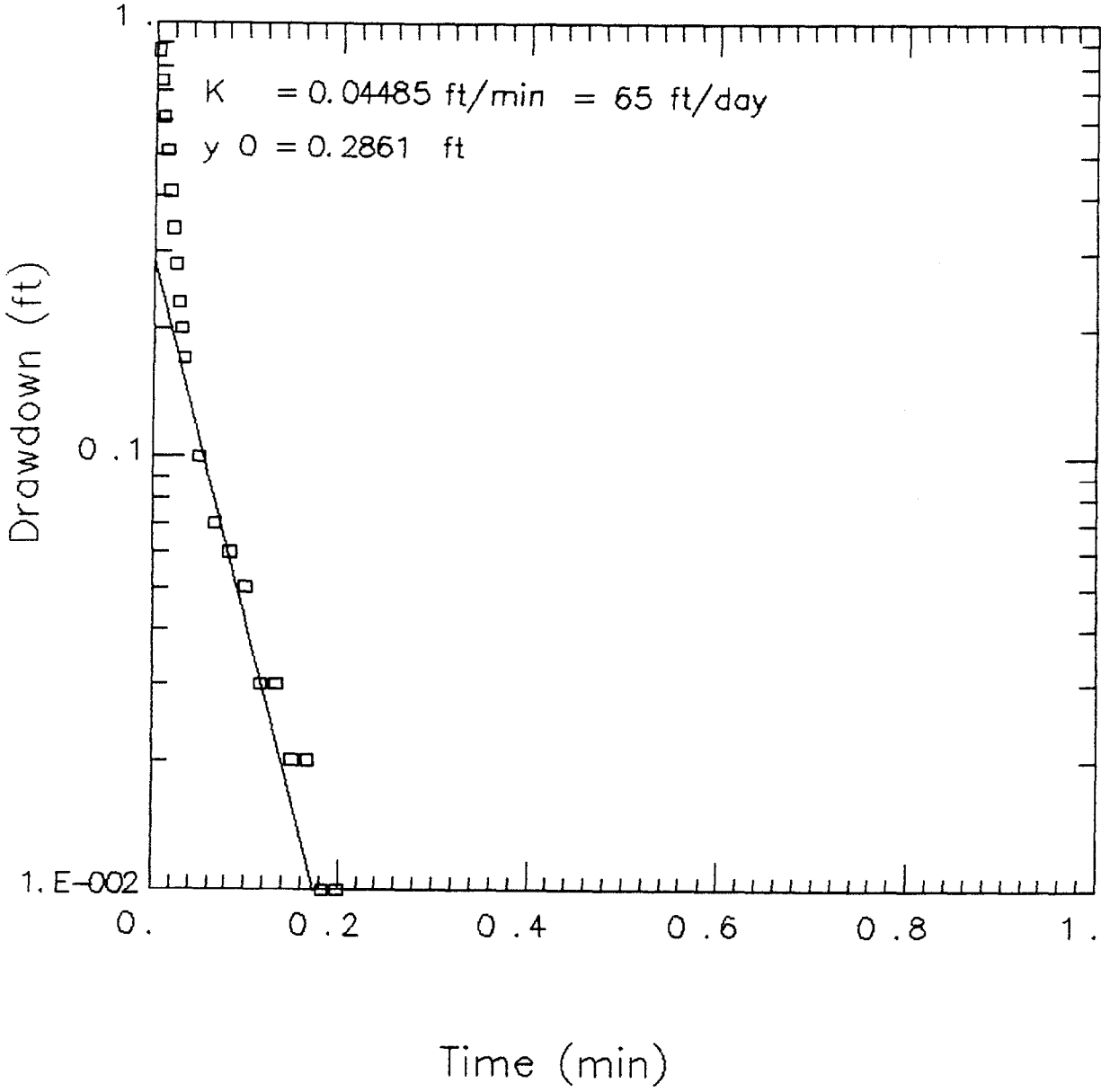

Slug Extraction Well 13-MW-6
K = 0.03391 ft/min = 48 ft/day
y 0 = 0.1192 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)


Slug Extraction Well 13-MW-7
K = 0.07855 ft/min = 113 ft/day
y 0 = 0.624 ft
Drawdown (ft)
1
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
Time (min)

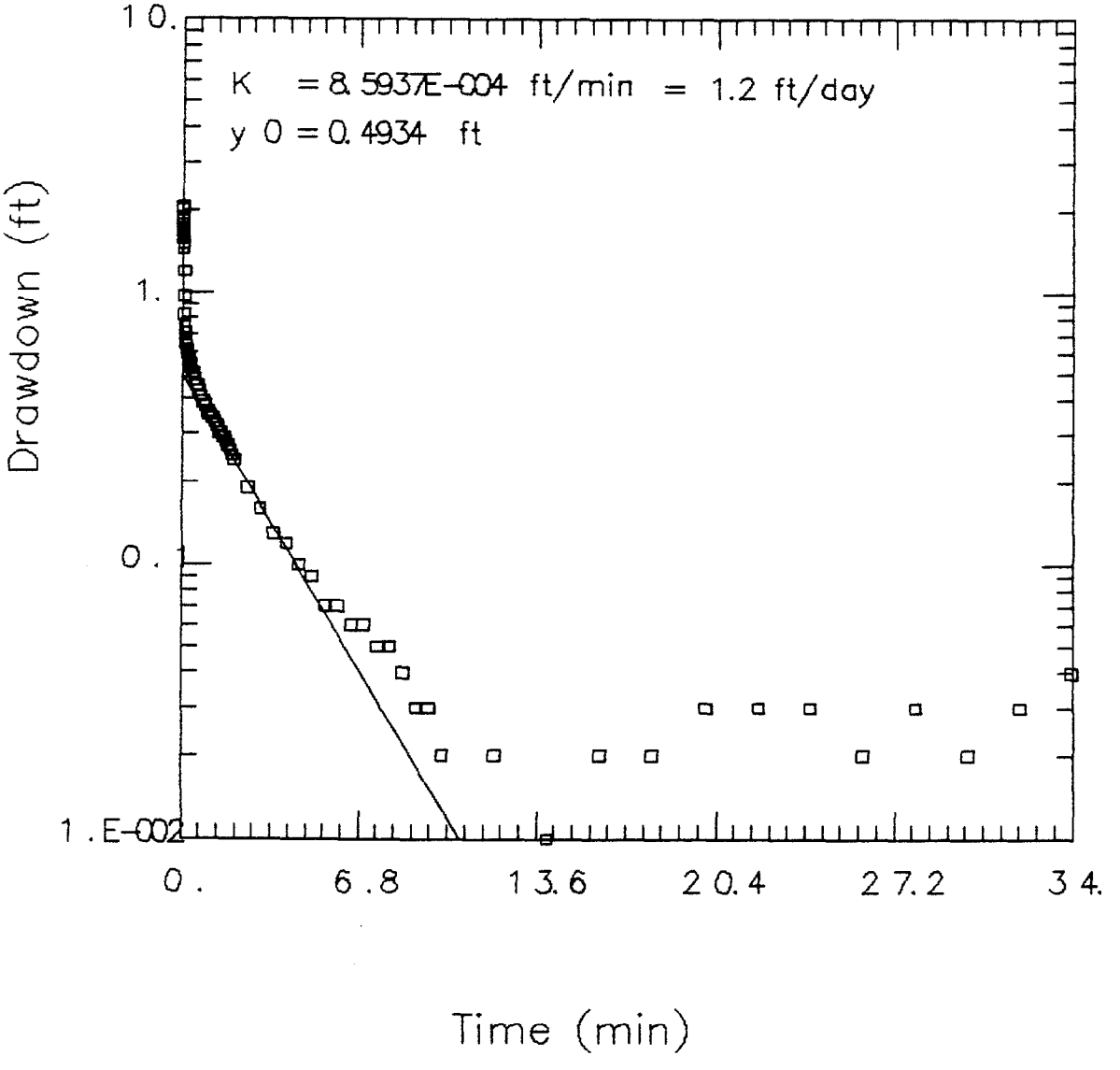
Slug Extraction Well 13-MW-10



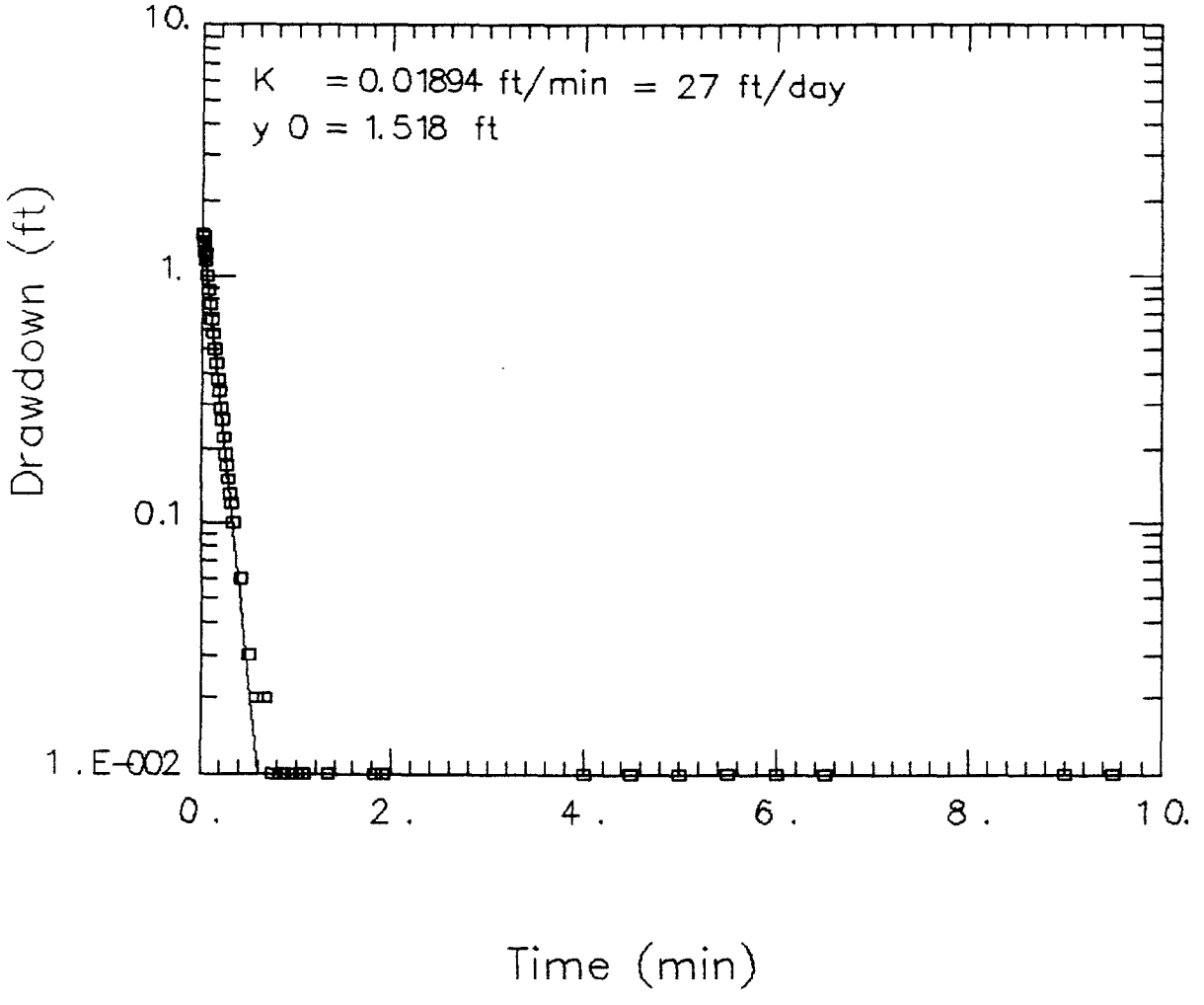
Slug Extraction Well 13-MW-11



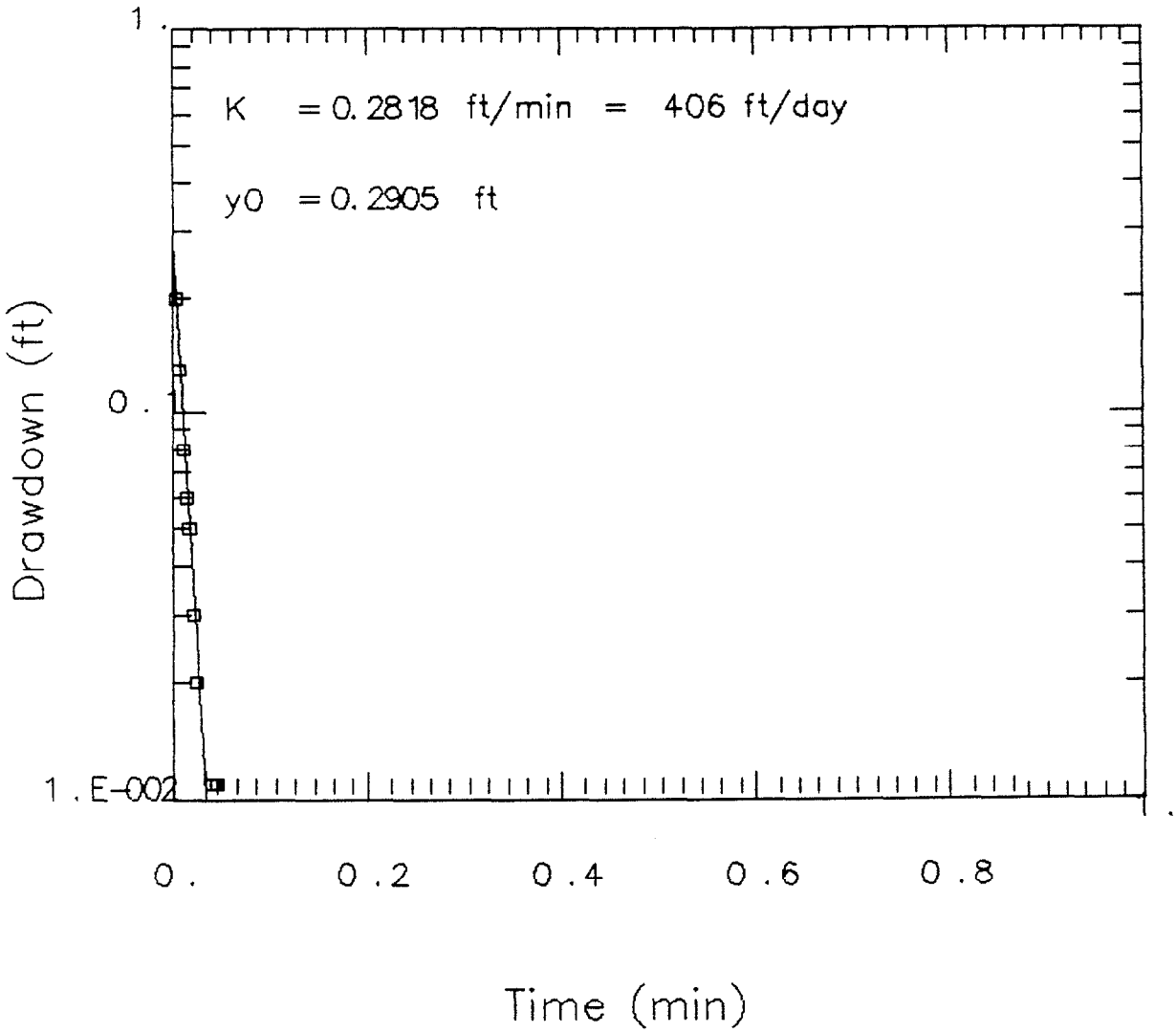
Slug Extraction Well 13-MW-12



Slug Extraction Well 13-MW-13



Slug Extraction Well 13-MW-14



APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL REPORT

AND

DATA REVIEW CHECKLIST

QUALITY ASSURANCE/QUALITY CONTROL REPORT

APPENDIX C

1.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) REPORT

This report provides a summary of the QA/QC procedures carried out as part of this project.

This project was conducted in accordance with the approved Quality Assurance/Quality Control and Data Management Plan and Field Sampling Plan dated April 1989. The QA/QC plan was developed based on guidance provided in *Sample and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program,* NEESA 20.2-047B. The program implemented at the Subase was performed under NEESA Level C Guidelines. This is equivalent to Data Quality Objective (DQO) Level 3 as defined by the USEPA. The major differences between Navy Level C and Navy Level D (DQO Level 4) occur in the analytical procedures used and validation of data. Level C allows for the use of EPA approved analytical methods whereas Level D requires the use of CLP procedures only. However, CLP analytical procedures were used for this project. Level C involves data review as described in Section 1.3 of this appendix, in contrast to the CLP validation required for Level D.

This report provides a discussion of field QC samples, field audits, data validation and data quality objectives.

1.1 Field Quality Control (QC) Samples

The QA/QC plan called for the collection of field duplicates, referee duplicates, trip blanks, field blanks, and equipment rinsates. Matrix spike and matrix spike duplicates were also analyzed as a part of laboratory QA/QC. Quality control samples specified frequencies to be collected, and actual sample quantity collected as part of this project are summarized in Table C-1.

The referee duplicates were collected by Alliance Technologies, an EPA oversight contractor. To date final results of the referee duplicate analyses have not been received, however, the USEPA has indicated that preliminary results indicate the precision of the analytical results is acceptable. The trip blanks contained deionized laboratory water which originate at the laboratory, stay with the samples, and are sent back to the laboratory. The equipment rinsates consisted of distilled water utilized as a final rinse during equipment decontamination procedures. The field blanks were samples of driller's water, and water used for equipment decontamination.

A small number of trip blanks contained low levels of volatile organics, but neither trip nor field blanks demonstrated any significant problems. Equipment rinsates were found to contain elevated levels of metals in the beginning of the sampling program. It was determined that the use of ten percent (10%) nitric acid solution as a decon fluid on the driller's split spoons may have been causing leaching of metals into the rinsates. This procedure was modified to use 1% nitric acid solution and the levels of metals in the rinsates did diminish. The equipment rinsates caused the estimation of some inorganic data, as is discussed in Section 1.3.2.

Matrix spikes and matrix spike duplicates were run for volatiles, semi-volatiles, and pesticides/PCBs at a frequency of 1 in 20 samples of similar matrix or one per batch of samples sent

TABLE C-1
SUMMARY OF QA/QC SAMPLES

SAMPLE TYPE	SPECIFIED FREQUENCY	SPECIFIED SAMPLE QUANTITY	ACTUAL SAMPLE QUANTITY
Field Duplicates	10% per matrix	32	36
Referee Duplicates	As determined by USEPA	---	10
Equipment Rinsates	Collect one per day, analyze every other day. Analyze remaining samples if pertinent analytes are found in the rinsates.	73	73
Trip Blanks	One per cooler containing VOC samples.	47	47
Field Blanks	One per source of decon and drilling water.	3	4

1. Matrix spikes and matrix spike duplicates were performed at a frequency of 5% per matrix for organic analyses.
2. Matrix spikes and duplicates were performed at a frequency of 5% per matrix for inorganic analyses.

to the laboratory, whichever was greater. For metals analysis, a duplicate and a matrix spike were run for every 20 samples of similar matrix, or one per batch of samples. Matrix spike recoveries were generally acceptable although small amounts of data were estimated or rejected based on poor matrix spike recoveries. See Section 1.3 for further discussion.

1.2 Field Audits

Several audits were performed by Atlantic's QA coordinator to ensure that the field work was conducted according to the procedures contained in the Field Sampling Plan. Field audits and/or inspections were performed on the following days:

DATE	TYPE OF SAMPLING OBSERVED
August 30, 1990	Subsurface Soils
November 13, 1990	Subsurface Soils
January 15, 1991	Ground Water

The field audits indicated general compliance with the required sampling procedures; several minor deviations of the procedures were noted and corrected.

USEPA oversight was provided by Alliance Technologies, Inc.

1.3 Data Validation

A checklist (included as an attachment to this appendix) was developed to facilitate the review of analytical data generated under Navy Level C requirements (DQO Level 4). The checklist incorporated the provisions for validation presented in the NEESA document entitled *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program,* NEESA 20.2-047B. The criteria presented in the checklist to evaluate sample and quality control results are based on the analytical requirements and validation guidelines defined in NEESA 20.2-047B.

Data validation involved the checking of laboratory generated forms for sample quality control, standards results, and assignment of the data qualifiers if appropriate.

The checklist provides summary pages for listing estimated and rejected data results upon completion of the validation process. The resulting data qualifiers were transcribed onto the laboratory data result forms and subsequently added to any data tables generated. A summary of the data qualifiers are provided on Table C-2.

It is important to note that there are a variety of reasons for estimating or rejecting data. Reasons for qualification of data are discussed in further detail in the subsequent sections. The completed data review checklists provide validation information pertaining to any specific samples.

1.3.1 Estimation of Laboratory Data (Organics)

The highest percentage of organic data estimation was based upon results of method blanks,

TABLE C-2
LABORATORY ANALYTICAL DATA QUALIFIERS

Organic Data Qualifier Flags	
ND	None detected.
J	The "J" flag indicates an estimated value due to validation requirements or when the data indicates the presence of a compound that meets identification criteria, but the quantitated value is less than the CRQL.
B	The "B" flag indicates that the analyte was found in the associated blank as well as in the sample.
D	The "D" flag indicates that the sample was diluted due to high concentrations.
E	The "E" flag indicates compound concentrations that exceed the calibration range of the GC/MS instrument.
X or Y	The "X" or "Y" flag indicates that the compound values have been edited on a laboratory data system.
R	The "R" flag indicates that the result is rejected based on validation guidelines.
Inorganic Data Qualifier Flags	
ND	None detected.
J	The "J" flag indicates an estimated value due to laboratory or data validation requirements.
B	The "B" flag indicates that the reported value is less than the CRDL, but greater than the IDL (Instrument Detection Limit).
R	The "R" flag indicates that the result is rejected based on validation guidelines.

equipment rinsates and trip blanks. The finding of organics in any of these blanks affects the sample results by allowing the reviewer to raise the detection limits of these analytes in associated samples (see Section B.7 of the Data Review Checklist). Other reasons for estimating relatively small amounts of organic data included the following:

- exceeded holding times;
- poor duplicate reproducability;
- matrix spike recoveries exceeding limits;
- surrogate recoveries exceeding limits;
- internal standards exceeding limits;
- pesticides calibration check compounds and continuing calibration check compounds outside of limits; and
- pesticides DDT and endrin allowable percent breakdown exceeded.

Several groups of samples were resampled due to grossly exceeded holding times. One batch of pesticide samples was estimated rather than rejected based on exceeding holding times. These samples included: 2WTB6(0-2), 2WTB6(4-6), 2WTB4(0-2), 2WTB1(8-10), 2WTB1 (10-12), 2WTB1(15-17), and 2WTB1(20-22). These were extracted within holding time but were analyzed eight to nine days outside holding time. Pesticides tend to exhibit stability once extracted into solvent. Since these samples were extracted within holding times, it was decided to estimate the data results rather than reject them. Data from other samples in the vicinity was evaluated before making this decision, and the results compared favorably.

1.3.2 Estimation of Laboratory Data (Inorganics)

The two main causes of estimated inorganic data were the presence of analytes in method and equipment blanks, and matrix spike recoveries outside of acceptable limits. These two factors accounted for the estimation of a significant amount of inorganic data. A small amount of inorganic data was also estimated based on poor laboratory and field duplicate reproducability.

1.3.3 Rejection of Laboratory Data (Organics)

Very few samples were rejected for organic parameters. One sample, 15TB3(4-8) pesticides was rejected due to holding times being grossly exceeded. Two samples, 8MW2(10-12) and 8TB3 (10-12), had positive pesticides rejected due to the lack of confirmatory runs. A few analytes were rejected due to the following problems:

- matrix spike recoveries < 10%;
- surrogate recoveries < 10%; and
- pesticides DDT and endrin exceeding allowable percent breakdown.

1.3.4 Rejection of Laboratory Data (Inorganics)

A small amount of none detected inorganic results were rejected as a result of matrix spike recoveries < 30%.

Due to the large number of samples analyzed in this investigation, the preceding sections discussing estimation and rejection of data are of a general scope. Only major sources of data

qualification and notable individual samples were discussed. The reasons for qualifying all individual samples are noted on the completed data review checklists.

1.4 Data Quality Objectives

Data validation was used to evaluate whether the data quality objectives (DQO) for all measurements (field and laboratory) had been reached. The DQOs include considerations of precision, accuracy, and completeness as summarized in the following paragraphs.

Precision is a test of the repeatability of a measurement. Precision is evaluated directly by recording and comparing multiple measurements of the same parameter on the same sample under the same conditions. These samples can take the form of laboratory or field duplicates. Precision is considered acceptable if the relative percent difference (RPD) between two samples is within ± 20 percent. The RPD is calculated as:

$$RPD = \frac{V1 - V2}{\left(\frac{V1 + V2}{2}\right)} x100$$

Where V_1V_2 = two values obtained by analyzing duplicates.

Duplicate analysis results were scrutinized as part of the data validation process. RPDs were calculated by the laboratory and as part of data validation. Approximately seven percent of the analytical results were estimated due to duplicates having RPDs greater than 20 percent.

Accuracy of analysis was determined by the evaluation of matrix spike samples of known quantities. The degree of accuracy and recovery of an analyte expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined in the analysis. Unless otherwise specified, the QC objective for accuracy is a percent recovery of 75 to 125 percent.

Accuracy calculations, prepared by the laboratory, are provided in the laboratory analytical package. Analytes exhibiting values lower or higher than this were estimated in associated samples. Samples for inorganic analysis which were not detected and had associated spike recoveries <30% were rejected as part of data validation. Samples for organic analysis which were none detected and had spike recoveries <10% were rejected as part of data validation.

Completeness is a measure of the amount of valid data obtained relative to the total amount of data generated. This project's QC objective for completeness, as a percentage of valid data reported, was ≥90%. The actual completeness was calculated as follows:

$$C=100\frac{V}{T}$$

where: C = percent completeness
V = number of judgements deemed valid
T = total number of analytes measured

$$C=100x\frac{36863}{37182}=99\%$$

Thus the completeness, or percentage of results determined valid, equaled 99%.

Based upon the performance of both field and laboratory QC samples, the data quality objectives for this project were met or exceeded. The data validation process was adequate to determine any significant problems with the data generated. Precision, accuracy and completeness were all acceptable.

DATA REVIEW CHECKLIST

PART A: DATA SUMMARY

Case Nos.:_____ Laboratory:_____

Site: _____ Reference:_____

ORGANICS:

Date:_____ Reviewer:_____

Aqueous Samples:_____

_____

Soil/Sediment Samples:_____

_____

QC Samples:_____

_____

INORGANICS:

Date:_____ Reviewer:_____

Aqueous Samples:_____

_____

Soil/Sediment Samples:_____

_____

QC Samples:_____

_____

A.1.0 Data Review Checklist		YES	NO	N/A
A.1.1	Does the package contain any Volatiles (VOA) data?	___	___	___
A.1.2	Does the package contain any Semivolatiles (ABN) data?	___	___	___
A.1.3	Does the package contain any Pesticides/PCB (PEST) data?	___	___	___
A.1.4	Does the package contain any Metals/Inorganic data?	___	___	___
A.1.5	Does the package contain any non-TCL data?	___	___	___

A.2.0 Acceptability of Data

A.2.1	Are all VOA data results acceptable as reported?	[___]	___	___
	If no, list exceptions in A.3.0 and A.4.0.			
A.2.2	Are all ABN data results acceptable as reported?	[___]	___	___
	If no, list exceptions in A.3.0 and A.4.0.			
A.2.3	Are all PEST data results acceptable as reported?	[___]	___	___
	If no, list exceptions in A.3.0 and A.4.0.			
A.2.4	Are all Metals/Inorganic data acceptable as reported?	[___]	___	___
	If no, list exceptions in A.3.0 and A.4.0.			
A.2.5	Are all non-TCL data results acceptable as reported?	[___]	___	___
	If no, list exceptions in A.3.0 and A.4.0.			

A.3.0 Estimated Data Results

List estimated data results:

Sample	Fraction	Analyte	Value	Reason

A.4.0 Rejected Data Results

List rejected data results:

Sample	Fraction	Analyte	Value	Reason

PART B: ORGANIC DATA REVIEW

B.1.0 Data Completeness and Deliverables	YES	NO	N/A[1]
B.1.1 Is the Case Narrative present?	[___][2]	___	___
B.1.2 Is the Chain of Custody present?	[___]	___	___
B.1.3 Are any NEESA deliverables missing from the data package?	___	[___]	___

RECOMMENDED ACTION: Call laboratory project manager for explanation/resubmittal of any missing deliverables.

B.1.4 Were the missing deliverables received?	[___]	___	___

B.2.0 Case Narrative

B.2.1 Does the Case Narrative indicate any problems with any of the analyses?	___	[___]	___

List noted problems here:

_____

_____

B.3.0 Holding Times

B.3.1 Review COC for sampling date, and review Forms I for date of analysis. Were any VOA, ABN, or PEST samples analyzed outside of holding times?	___	[___]	___

1) Not Applicable
2) Bracketed column is desired response. Deviation from bracketed response requires following Recommended Action.

B.3.1 Continued . . .

RECOMMENDED ACTION: If any sample is extracted or analyzed outside of holding times, estimate all positive detects in the associated samples. If holding times are grossly exceeded, the reviewer may choose to reject non-detected results.

List samples (fraction) analyzed outside of holding times, and action taken:

_____

_____

B.3.2 Review Forms I for dates of extraction. Were any ABN or PEST samples extracted outside of holding times? ___ [___] ___

List samples (fraction) extracted outside of holding times, and action taken:

_____

_____

B.3.3 If any samples were reanalyzed outside of holding times, are both the original and the reanalyzed runs reported? [___] ___ ___

B.3.4 Review COC for shipping date. Were samples shipped within 24 hours of collection? [___] ___ ___

B.4.0 Surrogate Recoveries

B.4.1 Review Forms II. Are any surrogate recoveries for any VOA or PEST samples or blanks outside of QC limits? ___ [___] ___

If yes, were samples reanalyzed? [___] ___ ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.4.1 Continued . . .

Reanalysis okay? [___] ___ ___

RECOMMENDED ACTION: For VOA samples estimate positive results within that region of the chromatogram in the associated samples. (No action for PEST samples).

List associated samples (compounds) and action taken:

_____

_____

_____

B.4.2 Are any surrogate recoveries in any ABN blank outside of QC limits? ___ [___] ___

If yes, was blank reanalyzed? [___] ___ ___

Reanalysis okay? [___] ___ ___

RECOMMENDED ACTION: Estimate all positive results in all associated samples.

List associated samples (compounds) and action taken:

_____

_____

_____

B.4.3 Are any two surrogates in either the acid or the base/ neutral fraction of any ABN sample outside of QC limits? ___ [___] ___

If yes, were samples reanalyzed? [___] ___ ___

Reanalysis okay? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results within that region of the chromatogram in associated samples.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.4.3 Continued . . .

List associated samples (compounds) and action taken:

_____

_____

_____

B.4.4 Are any surrogates in any sample recovered at less than 10%? ___ [___] ___

If yes, were samples reanalyzed? [___] ___ ___

Reanalysis okay? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results and reject non-detected results within that region of the chromatogram in associated samples.

List associated samples (compounds) and action taken:

_____

_____

_____

B.5.0 Matrix Spike/Matrix Spike Duplicates

B.5.1 Were matrix spikes analyzed at the required frequency for each of the following matrices?

Low Water [___] ___ ___

Low Soil [___] ___ ___

Medium Soil [___] ___ ___

List missing MS/MSD (fraction, matrix, concentration):

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.5.2 How many VOA spike recoveries are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 10	___ out of 10	___ out of 10	___

B.5.3 How many VOA RPDs are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 5	___ out of 5	___ out of 5	___

RECOMMENDED ACTION: If recovery is >10%, then estimate positive results for that compound in the unspiked sample. If the recovery is <10%, then estimate positive results or reject negative results for that compound in the unspiked sample.

List affected samples (compound) and action taken:

_____

_____

B.5.4 How many ABN spike recoveries are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 22	___ out of 22	___ out of 22	___

B.5.5 How many ABN RPDs are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 11	___ out of 11	___ out of 11	___

List affected samples (compounds) and action taken:

_____

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.5.6 How many PEST spike recoveries are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 12	___ out of 12	___ out of 12	___

B.5.7 How many PEST RPDs are outside QC limits?

Water	Low Soil	Medium Soil	N/A
___ out of 6	___ out of 6	___ out of 6	___

List affected samples (compound) and action taken:

_____

_____

B.5.8 If any VOA, ABN, or PEST spike percent recoveries or RPDs are outside QC limits, refer to questions B.4.1 and B.4.2. Are any of the surrogate percent recoveries for the spike/blank associated with the MS/MSD pair also outside of QC limits? ___ [___] ___

RECOMMENDED ACTION: If both the MS/MSD pair and the associated method spike/blank are outside QC limits, then estimate positive results and reject non-detected results for all compounds in all samples associated with that spike/blank.

If yes, list associated samples and action taken:

_____

_____

B.5.9 Was the sample that was analyzed as an MS/MSD also analyzed as a field duplicate? [___] ___ ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.5.10 If no, compare the results for the non-spiked compounds in the MS/MSD/sample set, and calculate RSDs. Are any water RSDs > 30%, or any soil RSDs > 50%? ___ [___] ___

RECOMMENDED ACTION: If any RSD is > 30% for waters or > 50% for soils, estimate positive results for that compound in the affected samples.

If yes, list affected compounds (samples) and action taken:

_____

_____

B.6.0 Field Duplicate Samples

B.6.1 Were field duplicate samples collected and analyzed at the required frequency? [___] ___ ___

B.6.2 Compare the field duplicate sample results as well as the MS/MSD/sample unspiked compound results. Calculate the RPD or RSD for each compound. Was any RPD or RSD > 30% for aqueous samples or > 50% for soil samples? ___ [___] ___

RECOMMENDED ACTION: If any RPD or RSD is > 30% for aqueous samples or > 50% for soil samples, estimate positive results for that compound in all the samples used to calculate the RPD or RSD.

If yes, list the compound (RPD or RSD), and action taken:

_____

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.7.0 Method Blank/Spike Samples

B.7.1 For each day and each instrument of VOA sample analysis, has a method blank/spike sample been analyzed for each sample matrix and concentration analyzed? [___] ___ ___

If no, list missing method blank/spike samples (date, instrument, matrix, level):

B.7.2 For each extraction date and each instrument of ABN and PEST analysis, has a method blank/spike sample been analyzed for each sample matrix and concentration analyzed? [___] ___ ___

If no, list missing method blank/spike samples (fraction, extraction date, instrument, matrix, level):

B.7.3 In addition to the method blank/spike sample, was a PEST blank/spike sample, spiked with at least one PEST or PCB compound besides dibutylchlorendate, analyzed? [___] ___ ___

If no, list associated samples:

B.7.4 Review Forms IV. Are all analyzed samples listed? [___] ___ ___

B.7.5 Were any of the following compounds detected in any VOA or ABN method blank/spike samples?

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.7.5 Continued . . .

a. Methylene chloride	___	[___]	___
b. Acetone	___	[___]	___
c. 2-Butanone	___	[___]	___
d. Toluene	___	[___]	___
e. Phthalate esters	___	[___]	___

If yes, multiply 10x the highest blank concentration found for each compound to determine "action level."

B.7.6 Were any of the remaining TCL compounds detected in any VOA, ABN or PEST method blank/spike sample? ___ [___] ___

If yes, multiple 5x the highest blank concentration found for each compound to determine the "action level."

RECOMMENDED ACTION: Review Forms IV to determine associated samples. Review Forms I for affected samples. If associated sample concentration is < CRQL and < action level, report value as the CRQL (non-detect). If the associated sample concentration is > CRQL but < action, level, elevate detection limit to sample concentration and report as non-detect.

List associated samples (compound) and action taken:

B.7.7 Were trip, field, and equipment blanks analyzed at the required frequency? [___] ___ ___

If no, list missing blanks (type, date):

B.7.8 Were any contaminants detected in any of the equipment blanks analyzed? ___ [___] ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.7.8 Continued . . .

If yes, were the remaining equipment blanks additionally analyzed? [___] ___ ___

B.7.9 Were any of the following compounds detected in any VOA or ABN trip, field or equipment blanks?

a. Methylene chloride	___	[___]	___
b. Acetone	___	[___]	___
c. 2-Butanone	___	[___]	___
d. Toluene	___	[___]	___
e. Phthalate esters	___	[___]	___

If yes, multiply 10x the highest blank concentration found for each compound to determine "action level."

B.7.10 Were any of the remaining TCL compounds detected in any VOA, ABN or PEST trip, field or equipment blank? ___ [___] ___

If yes, multiple 5x the highest blank concentration found for each compound to determine the "action level."

RECOMMENDED ACTION: Same as above, except qualifications are limited to the samples shipped with the trip blank and/or the samples taken the same day as the equipment/ field blank.

List associated samples (compound) and action taken:

_____

_____

B.8.0 GC/MS Tuning

B.8.1 Review Forms V. Was a GC/MS tune performed every twelve hours on each VOA and ABN instrument? [___] ___ ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.8.2 Were the ion abundance criteria met for each GC/MS tune performed? [___] ___ ___

If no, list tune (fraction, date, time, instrument, matrix) and associated samples:

B.8.3 Were all samples run within twelve hours of an acceptable GC/MS tune? [___] ___ ___

If no, list affected samples and action taken:

B.9.0 Initial Calibration of the GC/MS System

B.9.1 Review Forms VI. Are the %RSDs $\leq$ 30% for all CCC compounds for all VOA and ABN initial calibration curves? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results for that compound in associated samples. If %RSD > 50%, estimate non-detected results as well in associated samples.

List associated samples (compounds) and action taken:

B.9.2 Are the RRFs $\geq$ 0.300 for all VOA SPCC compounds (except bromoform $\geq$ 0.250)? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results for that compound in associated samples.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.9.2 Continued . . .

List associated samples (compounds) and action taken:

_____

_____

_____

B.9.3 Are the RRFs $\geq$ 0.050 for all ABN SPCC compounds? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results for that compound, and reject non-detected results for that compound in associated samples.

List associated samples (compounds) and action taken:

_____

_____

_____

B.10.0 Continuing Calibration of the GC/MS System

B.10.1 Review Forms VI. Are the %Ds $\leq$ 25% for all VOA and ABN CCC compounds? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results for that compound in associated samples. If %D > 50%, then estimate non-detected results as well in associated samples.

List associated samples (compounds) and action taken:

_____

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.10.2 Are the RRFs $\geq$ 0.300 for all VOA SPCC compounds (except bromoform $\geq$ 0.250)? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results for that compound in associated samples.

List associated samples (compounds) and action taken:

_____

_____

_____

B.10.3 Are the RRFs $\geq$ 0.050 for all ABN SPCC compounds? [___] ___ ___

RECOMMENDED ACTION: Estimate positive results, and reject negative results for that compound in associated samples.

List associated samples (compounds) and action taken:

_____

_____

_____

B.11.0 Internal Standard Performance

B.11.1 Review Forms VIII. Are the internal standard areas for all VOA and ABN analyses within -50 to +100% of the associated continuing calibration standard? [___] ___ ___

If no, list affected samples (I.S.) and action taken:

_____

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.12.0 Pesticide Instrument Calibration

B.12.1 Review Forms VIII. Are the initial calibration linearity check compound %RSDs ≤ 10% for the quantitation column? [___] ___ ___

If no, list compounds (%RSD):

RECOMMENDED ACTION: If linearity criterion for DDT is not met, then an additional three point calibration curve is required for the quantitation of DDT, DDE, and DDD.

Was the additional three point calibration curve for DDT analyzed? [___] ___ ___

RECOMMENDED ACTION: If initial linearity criteria are not met, then estimate positive results for that compound in associated samples.

List associated samples and action taken:

B.12.2 Review Forms VIII. Was the proper 72-hour analytical sequence followed? [___] ___ ___

If no, note discrepancies and action taken:

B.12.3 Review Forms IX. Are the continuing calibration factor %Ds ≤ 15% for the quantitation column, and ≤ 20% for the confirmation column for all compounds? [___] ___ ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.12.3 Continued . . .

RECOMMENDED ACTION: Estimate positive results for that compound in the associated samples.

List associated compounds (samples) and action taken:

B.13.0 Pesticide Instrument Performance

B.13.1 Review Forms IX. Are the DDT RTs ≥ 12 minutes for all packed column analyses? [___] ___ ___

If no, list affected samples and action taken:

B.13.2 Review Forms IX. Are all continuing calibration standard compounds within the defined RT windows? [___] ___ ___

List affected samples (compounds) and action taken:

B.13.3 Review Forms VIII. Are the % Breakdowns for either DDT or endrin or the combined % Breakdown > 20%? ___ [___] ___

RECOMMENDED ACTION: DDT - estimate positive results for DDT in associated samples. If DDT was not detected, but DDD and DDE are positive, then reject the detection limit for DDT. Endrin - estimate positive results for endrin in associated samples. If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then reject the detection limit for endrin.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

B.13.3 Continued . . .

List associated samples (compounds) and action taken:

_____

_____

B.13.4 Review Forms VIII. Are the DBC RT %Ds < 2.0% for all packed column analyses? [___] ___ ___

If no, list affected samples (%D) and action taken:

_____

_____

B.14.0 Pesticide Compound Identification

B.14.1 Review Forms I and X. Are positive identifications confirmed by analysis on a secondary column? [___] ___ ___

RECOMMENDED ACTION: If confirmation of positive detects was not performed, reject results.

List affected samples (compound) and action taken:

_____

_____

B.14.2 Are the RTs for the compounds identified within the defined RT windows for both the primary and the confirmation column? [___] ___ ___

If no, list affected samples (compound, column) and action taken:

_____

_____

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

PART C: INORGANIC DATA REVIEW

	YES	NO	N/A
C.1.0 Data Completeness and Deliverables			
C.1.1 Is the Case Narrative present?	[___]	___	___
C.1.2 Is the Chain of Custody present?	[___]	___	___
C.1.3 Are any NEESA deliverables missing from the data package?	___	[___]	___

RECOMMENDED ACTION: Call the laboratory project manager for explanation/resubmittal of any missing deliverables.

C.1.4 Were the missing deliverables received?	[___]	___	___
C.2.0 Case Narrative			
C.2.1 Does the Case Narrative indicate any problems with any of the analyses?	___	[___]	___

List noted problems here:

_____

_____

_____

C.3.0 Preservation and Holding Times			
C.3.1 Review the COC for sampling date, and review the Forms 10 for analysis dates. Were any mercury (28 days), cyanide (14 days), or metals (6 months) samples analyzed outside of holding times?	___	[___]	___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

RECOMMENDED ACTION: Estimate positive results for any samples which were analyzed outside of holding times.

List samples/analyte analyzed outside of holding times, and action taken:

C.4.0 Calibrations

C.4.1 Review Forms 2A. Were the ICV and CCV %R 90-110% for metals, 80-120% for mercury, and 85-115% for cyanide? [___] ___ ___

If no, list analytes (%R) and affected samples:

RECOMMENDED ACTIONS: If following any reanalysis, the ICV recovery for any metal is still outside of the 90-110 %R window, all sample results for that metal shall be rejected.

Estimate positive results for metals (75-89%, 111-125%), for mercury (65-79%, 121-135%), and for cyanide (70-84%, 116-130%). Estimate non-detected results for metals (75-89%), for mercury (65-79%), and for cyanide (70-84%). Reject all results for metals (<75%, >125%), for mercury (<65%, >135%), and for cyanide (<70%, >130%).

List any affected samples, analytes, and the recommended actions:

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

C.5.0 Blanks

C.5.1 Was a preparation blank analyzed for each matrix, for every 20 samples, and for each digestion blank? [___] ___ ___

C.5.2 Review Forms 3. Were all elements less than the IDL? [___] ___ ___

If not, list the elements and the highest concentration of each found in any ICB, CCB or preparation blank.

C.5.3 Were any samples identified as field or equipment blanks? If so, review the Forms I for those samples and list the elements and the concentrations of each found in the field or equipment blanks. [___] ___ ___

List the action levels (10x highest concentration found in any calibration or preparation blank, and 5x highest concentration found in any field or equipment blank) for each element found in any blank.

RECOMMENDED ACTION: When the concentration of any analyte in a sample is greater than the IDL, but less than the Action Level, report the sample concentration with a J as estimated.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

List the actions taken and the affected samples.

C.6.0 Interference Check Standard

C.6.1 Review Forms 4. Were all %R of elements in the ICS AB solution > 80 and < 120%? [___] ___ ___

List the concentrations of any elements detected in ICS A > 2xIDL which should not be present.

RECOMMENDED ACTIONS: Estimate all associated sample results for those elements which did not meet the %R criteria. Reject all sample results for those elements for which %R was <50%.

For those elements present in the ICS A, which should not be present, estimate positive and non-detected results when the level of interferents in the sample are greater than 50% of that in the ICS. Reject positive results which are due entirely to the interfering element.

List any actions taken and the affected samples based on the results of the ICS.

C.7.0 Matrix Spike

C.7.1 Was a matrix spike prepared at the required frequency? [___] ___ ___

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

C.7.2 Review Forms 5A. Were all spike recoveries greater than 75% and less than 125% for elements for which the sample concentration was less than 4x the spike added? [___] ___ ___

C.7.3 Was a post digestion spike analyzed for ICP elements that did not meet required criteria for spike recovery (Form 5B)? [___] ___ ___

RECOMMENDED ACTIONS: Estimate all associated sample results for any analyte which does not meet the %R criteria. Reject all associated non-detects for any analyte for which the %R was less than 30%.

List the element, the percent recovery, and any actions taken based on the results of the spiked sample.

C.8.0 Laboratory Duplicates

C.8.1 Was a laboratory duplicate sample prepared at the required frequency? [___] ___ ___

C.8.2 Review Forms 6. Were all RPDs <20% for aqueous samples or <35% for soil samples (within ±2xCRDL for analytes whose concentration is less than 5x CRDL in the duplicate samples)? [___] ___ ___

RECOMMENDED ACTIONS: Estimate all associated positive sample results for any analyte whose RPD did not meet criteria.

List the element, the RPD, and any actions taken based on the results of the laboratory duplicates.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

C.9.0 Field Duplicates

C.9.1 Was a field duplicate pair identified? [___] ___ ___

C.9.2 If so, calculate the RPD for each element. Were all RPDs <30% for aqueous samples or <50% for soil samples (within 2xCRDL when results are less than 5xCRDL)? [___] ___ ___

RECOMMENDED ACTIONS: Estimate all associated positive sample results for any analyte whose RPD did not meet criteria.

List the element, the RPD, and any actions taken based on the results of the field blanks.

C.10.0 Laboratory Control Sample or Blank/Spike Sample

C.10.1 Was an LCS or method blank spike analyzed for every matrix and every digestion batch? [___] ___ ___

C.10.2 Was a control chart provided? [___] ___ ___

C.10.3 Review Forms 7. Were all LCS recoveries within the internal QC limits set by the laboratory? [___] ___ ___

C.10.4 Were samples reanalyzed when other QC problems were found with the data? [___] ___ ___

RECOMMENDED ACTIONS: Estimate all associated sample results for those analytes whose LCS recovery did not meet criteria.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

Reject all associated sample results for those analytes for which the LCS recovery was <50%. If the LCS results are outside the internal laboratory limits and if the matrix spike results are outside the CLP limits, and the laboratory did not reanalyze the samples, then reject all associated data.

List any analytes, the %R and any actions taken.

C.11.0 Graphite Furnace Atomic Absorption Quality Control

C.11.1	Were analytical spike recoveries calculated and written on the GFAA raw data?	[___]	___	___
C.11.2	Review the spike recoveries. Were all recoveries between 75-125%?	[___]	___	___
C.11.3	If not, was the Method of Standard Additions (MSA) used when required?	[___]	___	___
C.11.4	Were the correlation coefficients greater than 0.995?	[___]	___	___

RECOMMENDED ACTIONS: If sample absorbance is <50% of the post-digestion spike absorbance then, for sample results >IDL estimate the sample results. For non-detects, if the post-digestion spike recovery is >10% but <85%, estimate the detection limit (UJ). For post-digestion spike recovery <10%, reject the data. If MSA is required but not done, estimate the positive results. If the MSA correlation coefficient is <0.995, estimate the positive results.

List any analytes, affected samples, and any actions taken.

RECOMMENDED ACTION refers to the data qualification action suggested in the U.S. EPA Data Validation Guidelines. These actions are not absolute: care and professional judgement should be used when qualifying data.

APPENDIX D

APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

APPENDIX D

APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

1.0 CHEMICAL SPECIFIC ARARS

The following sections analyze federal and state requirements to determine whether or not they contain chemical specific standards that could be ARARs at NSB-NLON. Table 4-1 contains the status of each ARAR at each site. Table 4-2 is a listing of the most stringent chemical specific ARAR by media. These two tables, along with a further definition of ARARs, are found in Section 4.2 of this report.

1.1 Federal - Chemical Specific

Listed below is the chemical specific ARAR analyses for federal requirements.

Resource, Conservation and Recovery Act (RCRA) Hazardous Waste Standards — ARAR

40 CFR Parts 260 through 270

NSB-NLON is a RCRA treatment, storage or disposal facility (TSDF), therefore, RCRA correction action requirements under Section 3004u are applicable to all Solid Waste Management Units (SWMUs). The following sites are classified as SWMUs:

- CBU Drum Storage Area
- Torpedo Shops
- Goss Cove Landfill
- Bunker A-86
- Area A Wetland
- DRMO
- OBDANE
- Spent Acid Storage and Disposal Area
- Waste Oil Tank at Former Gasoline Station
- Area A Landfill
- OBDA
- Waste Oil Pit of Building 79 at Lower Base

To date, final regulations have not been promulgated to address corrective actions for SWMUs. Interim final guidance regarding corrective actions, to be considered, is found in EPA 530/SW89031 RCRA Facility Investigation (RFI) Guidance. Region I personnel indicated that the clean-up standards used in the RCRA corrective action program are based upon chemical information contained in the Integrated Risk Information System (IRIS) and Superfund guidance on risk assessment. In addition, Region I has developed a document titled "Supplemental Risk Assessment Guidance for the Superfund Program" which they use in establishing clean-up standards. This is identical to the method they use for Superfund risk assessments. As a result, based upon existing guidance, the clean-up standards for SWMUs and those generated by Superfund risk assessments are the same.

Three of the investigation sites (Lower Base, DRMO and Spent Acid Storage and Disposal Area) contain RCRA hazardous waste deposited prior to 1980, therefore RCRA regulations will only be applicable if these wastes are excavated. Regardless, sections of the RCRA requirements

are relevant and appropriate to areas containing RCRA hazardous waste. Final regulations regarding RCRA wastes are found in 40 CFR 260 through 270. In particular, the chemical specific numerical values in the ground water monitoring sections (40 CFR 264 subpart F) and the land disposal restriction section (40 CFR 268) contain chemical specific ARARs. The ground water standards are based on Maximum Contaminant Levels (MCLs), therefore, these regulations contain no chemical specific standards more stringent than those contained in the Safe Drinking Water Act (refer to section below regarding the SDWA).

The chemical specific standards in the land disposal restriction regulations would only be ARARs if hazardous wastes are excavated and disposed at another onsite or offsite location.

RCRA Solid Waste Standards — **Potential Future ARARs**

40 CFR 240 through 257

To date, solid waste regulations consist of recommended practices. No chemical specific standards have been promulgated under these standards other than the definition of an open dump which does reference MCLs and Water Quality Criteria (WQC). Future rule makings may be relevant and appropriate to some disposal areas and applicable to any new solid waste disposal areas created as part of remedial actions. The following areas contain solid waste: Goss Cove, DRMO, Area A, OBDA, OBDANE and Bunker A-86.

RCRA UST Standards — **ARAR**

40 CFR 280

These standards apply to all the underground storage tanks except for those used or storing heating oil. 40 CFR Part 280, Subpart F contains standards regarding remedial actions for releases from underground storage tanks. No chemical specific standards are contained in these regulations. The UST standards do require "removal of free product to the maximum extent practicable as determined by the implementing agency". CERCLA clean-ups do not encompass petroleum products therefore, strictly speaking, these standards are only ARARs for sites with underground tanks or pits containing hazardous substances. Regardless, the Naval Installation Restoration Program does address petroleum products, therefore, for continuity the UST standards will be considered ARARs in this report even if only petroleum contamination is present. The following sites contain underground petroleum storage tanks: Lower Subase, Former Gasoline Station, and Torpedo Shops.

Safe Drinking Water Act — **ARAR**

40 CFR 140 through 143

There are no public water supply wells located at NSB-NLON, therefore, SDWA requirements are not applicable. The base is located in an area that would have ground water classifications of Class II and III under EPA's guidelines for ground water classification and that have a GB/GA or GA classification pursuant to Connecticut's ground water classification system. The GB/GA designation means that ground water is presently known or presumed to be contaminated and that it is the State's long term goal to restore the ground waters to drinking water

quality. The GA designation means that ground water should be suitable for private drinking water supplies without treatment. The Class II designation is for ground waters that are not special highly valuable, irreplaceable drinking water sources, and that are current or potential sources of drinking water or have other beneficial uses. Class III ground water is not a potential source of drinking water and of limited beneficial uses. Class III ground waters include ground waters (1) with a total-dissolved solids (TDS) concentration over 10,000 mg/l or (2) that are so contaminated that they cannot be cleaned up using conventional water treatment methods.

As it is the goal of the state government to maintain or restore ground waters to drinking water quality, MCLs are relevant and appropriate requirements for the base. Proposed Maximum Contaminant Levels (PMCLs) should be considered when selecting a remedy at this site as they may soon replace the MCL being used for this purpose. Maximum contaminant level goals (MCLGs), secondary MCLs, and health advisories should also be considered at this site when developing a protective remedy when there are no MCLs.

The appropriateness of the state's GB/GA classification in areas that could be classified as Class III under the federal system and that are serviced by city water is questionable. These areas include Goss Cove, Lower Base, and DRMO. If not for the state designation, MCLs would not be ARARs in these areas. There is an administrative process to amend individual classifications.

Water Quality Criteria (WQC) ARAR

Section 304 of the Clean Water Act (CWA)

Water quality criteria are non-enforceable guidance developed under the Clean Water Act (CWA) and are used by the state, in conjunction with the designated use for a stream segment, to establish water quality standards under CWA 303. The state has classified the water quality of this segment of the Thames River as SC/SB. This classification is described as being suitable for fish, shellfish, and wildlife habitat; good aesthetic value; suitable for industrial cooling; and suitable for recreational boating and, in some places, bathing. The classification is further described as presently not meeting water quality criteria for one or more designated uses due to pollution. As these standards are non-enforceable guidance, they would not be applicable, however, many of the criteria are relevant and appropriate. In particular, the standards for in-stream water quality to protect aquatic organisms and those to protect human health from ingestion of fish are relevant and appropriate based upon designated water quality criteria goals for this section of the Thames River. Based upon information developed during the risk assessment, other values based upon more recent studies may be determined to be more appropriate than the water quality criteria.

There are several small streams and man-made drainage structures that transport storm water to the Thames River. It may not be appropriate to apply water quality criteria to protect aquatic life and for fish consumption to these surface waters.

All other water quality criteria (i.e., those to protect human health from ingestion of water and fish, and acute in-stream criteria to protect aquatic organisms) in certain circumstances, should be considered at this site when developing a protective remedy. Specifically, WQC for consumption of fish and water should be considered as potential clean-up standards for ground water when MCLs, PMCLs, MCLGs, or recent health advisories are not available. Acute aquatic WQC should be considered when there is no chronic criteria or criteria for fish consumption only.

Clean Air Act (NESHAPs) **Potential ARAR**

40 CFR Part 60

NESHAPs (National Emission Standards for Hazardous Air Pollutants) are a set of emissions of specific chemicals from specific production activities and would not be applicable, nor generally would they be relevant and appropriate. It is unlikely that any remedial actions will constitute listed productions processes under NESHAPs. NESHAP constituents (mercury, vinyl chloride and benzene) have been detected onsite, therefore, there is a possibility that selected remedial actions would make NESHAP standards relevant and appropriate.

Clean Air Act (NAAQs) (continued) **Potential ARAR**

40 CFR Part 50

National Ambient Air Quality Standards (NAAQs) are national limitations for ambient concentrations set for specific chemicals to protection national health and welfare. States develop State Implementation Plans (SIPs), which are reviewed and approved by EPA to meet these standards. Requirements set under the SIP are federally enforceable, and thus may become an ARAR. However, those requirements usually only apply to "major sources". No proposed remedial activities at NSB-NLON are expected to be classified as major. NAAQs do contain standards for lead and particulate matter which could potentially be relevant and appropriate to certain types or remedial actions.

Toxic Substances Control Act (TSCA) **Potential ARAR**

40 CFR Part 761

Among other requirements, TSCA authorizes EPA to establish regulations for the control of chemical substances or mixtures that pose an imminent hazard. To date, such regulations have been developed for polychlorinated biphenyls, fully halogenated chlorofluoroalkanes, and asbestos. The applicability and relevance of the PCB standards will be discussed below. Asbestos and halogenated chlorofluoroalkanes are not believed to be present in soil or ground water at NSB-NLON. EPA under TSCA reviews data on thousands of chemicals each year and from these preliminary reviews decides if a detailed review is warranted to determine if regulations are necessary. Part of this detailed review is a risk assessment. Risk assessments have not been performed on any of the chemicals found at this site.

PCB regulations under TSCA regulate the manufacture, use, storage and disposal of PCBs, and the cleanup of PCB spills. In general, these standards only apply to PCB items with concentrations above 50 ppm or to materials contaminated from such items. Four sites (Torpedo Shop, Area A, DRMO and Goss Cove Landfill) contain detectable levels of PCBs. None of these areas contain soil or ground water with PCB concentrations above 50 ppm. It is believed, based upon information provided by NSB-NLON, that the PCB contamination in Goss Cove, DRMO and Area A Landfill resulted from the storage/disposal of PCB items with PCB concentrations greater than 50 ppm. The source of PCB contamination at the Torpedo Shops is unknown.

The PCB regulations contain USEPA's spill cleanup policy which includes chemical specific guidance applicable to PCB spills which occurred after May 4, 1987. The contamination at Goss Cove and DRMO is believed to have occurred prior to May 4, 1987. As this is a policy and not a regulatory standard, and as it applies to spills which occurred after May 1987, the USEPA cleanup policy is not considered to be an ARAR. The policy, however, is to be considered. The policy contains numerical standards for solid surfaces and soils located in outdoor electrical substations, restricted access areas, and nonrestricted access areas. The standards for soils are 10 ppm PCBs by weight in non-restricted areas and 25 ppm PCBs by weight in restricted areas. Non-restricted areas include residential/commercial areas.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) **Not ARAR**

40 CFR Part 165 (recommended procedures) and 180 (tolerance levels)

Under FIFRA, USEPA regulates the sale, distribution, use, storage, and disposal of all pesticide products in the United States. EPA accomplishes this primarily by product registration and labeling requirements. It is illegal to dispose of a pesticide in a manner inconsistent with its label. No pesticide products have been detected at NSB-NLON, therefore this part of FIFRA is not a potential ARAR. Applied pesticides are not considered products. CERCLA cleanups do not encompass applied pesticide products, therefore, strictly speaking, these standards should not be ARARs at NSB-NLON except for at pesticide disposal areas. Regardless, the Naval Installation Restoration Program does encompass applied pesticides.

In addition to the labeling requirements, EPA has promulgated tolerance levels for pesticides and pesticide residues in or on raw agricultural commodities under the authority of Federal Food, Drug and Cosmetic Act.

At NSB-NLON, no agricultural commodities or wildlife are obtained for consumption, therefore, these tolerance levels are not potential ARARs. DDT and its metabolics are the only substances found at NSB-NLON for which tolerance levels have been established. These values should be considered when developing a protective remedy.

1.2 State of Connecticut Chemical Specific

Listed below is the chemical specific ARAR analyses for State of Connecticut requirements.

Hazardous Waste Management Regulations **ARAR**

22a-449(c)-100 through 110 RCSA (Regulations of Connecticut State Agencies)

Rationale for ARAR status is the same as for federal RCRA which is described above. For all applications to chemical specific ARARs, Connecticut's regulations are identical to EPA's.

Solid Waste Management Regulations **Not ARAR**

These regulations apply to solid waste disposal areas. Potentially the following areas at NSB-NLON could be considered Solid Waste Disposal Areas (SWDAs) under these requirements:

- Goss Cove;
- DRMO;
- Area A;
- OBDA;
- OBDANE; and
- Bunker A-86.

These regulations, among other requirements, prohibit open dumps, require permits to construct and operate SWDAs, contain standards for operation of SWDA to prevent hazards to human health or the environment, and have standards for closure of SWDAs. There are no chemical specific standards other than a reference to Connecticut's Water Quality Standards and Criteria, and standards for quality of public drinking water. Both of these standards are considered ARARs, therefore, the solid waste management regulations do not contain any new chemical specific ARARs.

Underground Storage Tank Regulations **ARAR**

22a-449(d) RCSA

These regulations contain standards applicable to non-residential underground storage tanks containing liquid oil or petroleum products, except for tanks under 2,100 gallons in size used solely for onsite heating or intermittent power generation. These regulations are applicable to the underground storage tanks located in the sites investigated under this study. There are no numerical chemical specific standards in the regulations. If a failure is determined, the owner is required to immediately cease such discharge and reclaim, recover and properly dispose of the discharged liquid and any other substance contaminated by it, restore the environment to a condition and quality acceptable to the commissioner, and repair damage caused by the discharge, all to the satisfaction of DEP. To the extent that these regulations require removal of free product, they will be considered ARARs. The above section regarding RCRA UST regulations should be referred to regarding the cleanup of petroleum products under CERCLA.

Pesticide Regulations **Not ARAR**

22a-174-1 through 29 RCSA

These regulations pertain to pesticide registration, classification, discarding of pesticide containers, and use of pesticides. There are no pesticides found at the site other than residuals of DDT and its metabolites in soil. As such, those regulations are not applicable. Neither are they relevant or appropriate as the regulations pertain to pesticide products and their use.

Air Pollution Control Regulations **Potential ARAR**

22a-174-1 through 20 RCSA

The applicability of New Source Performance Standards (NSPS) and National Ambient Air Quality Standards (NAAQS) under the state program is relevant and appropriate as described in the above section regarding the Federal Clean Air Act. Connecticut's Ambient Air Quality Standards are listed in Section 22a-174-24 RCSA and requirements regarding performance standards are in section 22a-174-3 RCSA.

Other significant potential ARARs in Connecticut's regulations regard requirements for fugitive dust, control of odors, and, most importantly, those regarding hazardous air pollutants.

Nuisance odors are prohibited by state regulations. There are numerical standards for twelve compounds, four of which are present at the NSB-NLON (methyl ethyl ketone, tetrachloroethene, toluene and phenol). All other nuisance odors are determined by the DEP, primarily by the ability to detect an odor in ambient air that has been diluted seven to one.

Under Connecticut's regulations, persons must take reasonable precautions to prevent the emission of fugitive dust. Reasonable precautions are further defined in the regulations 22a-174-18(b)(i) through (v), RCSA.

Connecticut's hazardous air pollutant regulations control over 800 different chemicals. Basically, these regulations prohibit the emission of any hazardous air pollutants from any stationary source at a concentration at the discharge point above maximum allowable stack concentrations. Maximum ambient stack concentrations are calculated to insure that listed Hazardous Limit Values (HLV) are not exceeded at the property line of the facility. HLVs for hazardous air pollutants for eight hour and 30 minute averaging times are listed in the regulations. These standards may be applicable to certain types of remediation such as air stripping. Although not generally applicable, particularly to non-stationary sources, these standards do appear relevant and appropriate as they contain ambient air standards for hazardous constituents. If available, the eight hour standard would be the relevant and appropriate requirement. If not available, the 30 minute standard will be used. For some inorganic compounds there are no standards relevant to the form of the compound, e.g., dust versus fumes versus oxides. In those cases the HLV that most closely relates to NSB-NLON will be a "to be considered" material, and the chemical form the standard applies to directly will be noted in the comment section of Table 4-2.

Standards of Water Quality **ARAR**

22a-426 CGS (Connecticut General Statutes)

These standards specify Connecticut Water Quality Standards and Classifications for surface and ground waters. The classification given by the state designates the desired use for waters of the state and, therefore, will dictate which water quality criteria are relevant and appropriate and will dictate whether or not standards in the state and federal Safe Drinking Water Act are relevant and appropriate. For example, if the designated surface water use is as a source of drinking water, MCLs and water quality criteria to protect human health from ingestion of water and fish would be ARARs. There are no actual numerical values in these statutes, however, they are the key factor in determining if values from other environmental programs are applicable, relevant or appropriate. Waters of the state include ground and surface waters. For further detail, refer to the above sections on Federal WQC and SDWA.

Water Pollution Control **Not ARAR**

22a-426 through 22a-438 CGS

These statutes and regulations govern, among other things, potential sources of pollution to the waters of the State and permits for discharges to the waters of the State. Waters of the State

include ground and surface waters. To date, the requirements for a permit have not been applied to inactive disposal areas. Orders to correct potential sources of pollution have been issued to several inactive disposal sites. There are no numerical standards in the statute, regulations, or orders, however, decisions made regarding cleanup standards under these orders should be considered. In particular, the state guidance regarding contaminated soil remediation should be considered. This guidance sets chemical specific standards to define clean soil based upon the ground water classification of an area. In areas such as NSB-NLON with a ground water classification or goal of GA the state guidelines define "clean" soils as those that leach metals below MCLs as determined by the EP Toxicity test, or for volatile organic contamination those soils that contain concentrations below the Connecticut DOHS action level on a mass basis, i.e., the mg/kg concentration in soil must be below the mg/l action level concentration for drinking water. It should be noted that the newer, more aggressive TCLP rather than the EP Toxicity test procedures was used for this investigation. The overall policy of the DEP is to stay away from numerical standards and rely on case-by-case decisions based upon site specific environmental setting, location of receptors, and ground and surface water classifications and goals. In selecting a remedial design, the state guidelines will be considered as a screening tool, however, final selection of a remedial design will rely primarily on a case-by-case analysis, i.e., the risk assessment.

Standards for Quality and Adequacy of Public Drinking Water **ARAR**

19-13-B101 through B102 RCSA

These regulations are similar to the federal SDWA requirements and will be considered ARARs for the same reasons explained in the above section on SDWA ARARs. As stated above, there are no public water supplies at the NSB-NLON. There is one private water supply located in a residential property along Route 12. This property was recently purchased by NSB-NLON. Regarding chemical specific standards, it should be noted that Connecticut has established MCLs for copper and cyanide. Connecticut also has a standard for EDB (ethylene dibromide) in private water supplies. The State of Connecticut has developed action levels for several chemicals. Action levels are defined as the limit that, when exceeded, could reasonably create a health risk to persons using the water for drinking or other purposes. These action levels should be considered when developing a protective remedy.

2.0 LOCATION SPECIFIC ARARS

The following sections analyze federal and state rules to determine whether or not they contain location specific standards that could be ARARs at NSB-NLON.

2.1 Federal - Location Specific Standards

Listed below is the location specific ARAR analyses for federal requirements.

RCRA Location Standards **Potential ARAR**

40 CFR 264.18

Only the Lower Base and the DRMO investigation sites contain hazardous waste and have

portions located in or adjacent to the 100 year flood elevations (see Figure D-1). Areas containing hazardous waste must be designated, constructed and operated, and maintained to avoid washout.

There are no Holocene age faults, salt domes, underground mines, or caves at the NSB-NLON.

CWA, Section 404, and the Rivers and Harbors Act, Section 10 — **Potential ARAR**

40 CFR 230 and 33 CFR 320-330

These standards regulate the discharge of dredged or fill material into navigable waters of the United States, including adjacent wetlands, and alterations, including structures and filling, in navigable waters of the United States. The DRMO, Area A, OBDA, Goss Cove, and Lower Base sites are located in wetlands, or adjacent to navigable waters, as shown in Figure D-1. The Thames River is a navigable water of the United States. As a result, these standards would be applicable to the above listed sites if regulated activities are conducted.

Executive Order 11988, Floodplain Management and Executive Order 11990, Protection of Wetlands — **Potential ARAR**

These orders require federal agencies, wherever possible, to avoid or minimize adverse impacts of Federal actions upon wetlands and floodplains, and to preserve and enhance the natural value of wetlands and floodplains. The following sites have sections located in floodplains or wetlands:

- DRMO;
- Area A;
- OBDA;
- Goss Cove; and
- Lower Base.

As a result, these requirements would be applicable to the listed sites if regulated activities are conducted.

National Historic Preservation Act — **Not ARAR**

16 USC Parts 470 et seq., 36 CFR Part 800

This act requires that any historical or cultural resources included on or eligible for inclusion on the Natural Register of Historic Places be identified. If such historical places or cultural resources are not present, or will not be affected, no further investigation regarding compliance with this act is necessary.

In preparing a draft environmental impact statement for the Thames River Dredging Project, a Phase I-A cultural resources survey was conducted in May, 1990. This investigation considered an approximately four mile section of the Thames River from its mouth on Long Island Sound northward to the Navy Subase at New London. Only four historic archeological sites were recorded in the general vicinity of the proposed dredging project area. The only site located in the

vicinity of any of the site investigation areas is the U.S.S. Nautilus Memorial, designated a National Historic Landmark in 1982, and towed to the Navy Subase in 1985. It is presently a popular tourist attraction. This landmark, however, will not be affected by any potential remedial activities.

Endangered Species Act — **Not ARAR**

16 USC Part 1531 et seq.

This act provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction. This act protects endangered species themselves and critical habitats for endangered species. In preparing a draft environmental impact statement for the thames River Dredging Project, both CTDEP and the United States Fish and Wildlife Service were contacted regarding the existence of threatened or endangered species in the vicinity of the proposed dredging project. This area includes all the investigation sites under this study. No known threatened or endangered species are known to exist in the project area. Furthermore, the ecological survey for the risk assessment did not detect the presence of any endangered species at NSB-NLON.

Wild and Scenic Rivers Act — **Not ARAR**

16 USC Part 1271, et seq., 36 CFR Part 297

This act established requirements applicable to projects affecting designated and proposed wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System. The Thames River nor any of its tributaries on the NSB-NLON property are designated or proposed to be designated as wild, scenic, or recreational rivers. As such, this act is not a potential ARAR.

Fish and Wildlife Coordination Act — **Potential ARAR**

16 USC Part 661 et seq., 40 CFR Section 122.49

This act is to protect fish and wildlife when Federal actions result in the control or structural modification of a natural stream or body of water. No controls or modifications are likely as part of potential remedial actions at this site. Regardless, this act is considered a potential ARAR as the Navy is a federal agency and natural bodies of water are present.

Coastal Zone Management Act — **Potential ARAR**

16 USC Part 1451 et seq.

This act requires that federal agencies conducting or supporting activities directly affecting the coastal zone perform these activities in a manner that is consistent with approved State coastal zone management program. Connecticut does have an approved Coastal Zone Management Program. The following sites, as shown in Figure D-1, are located within the coastal boundary: DRMO, Lower Base, Former Gas Station, and Goss Cove. As a result, remedial designs for these sites should consider this act, even though it is unlikely that activities regulated under this act will be conducted at this site.

Wilderness Act **Not ARAR**

16 USC Parts 1131 et seq.

This act creates the National Wilderness Preservation System in order to preserve the wilderness character of any designated areas. There are no wilderness areas within the project area.

Clean Air Act NAAQS **Potential ARAR**

40 CFR Part 50

EPA under the CAA has promulgated NAAQS for six pollutants which are referred to as criteria pollutants. Based upon these standards, air quality control regions throughout the country are classified as attainment or non-attainment for each criteria pollutant depending upon whether they meet the standard (attainment area) or do not meet the standard (non-attainment area). The NSB-NLON is located in the Eastern Connecticut (No. 41) air quality control region. This region is classified as an attainment area for total suspended particulates (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), and nitrogen dioxide (NO_2), and non-attainment for ozone (O_3).

Major sources of air pollution must comply with specific standards that vary depending upon whether the source is in an attainment or non-attainment area. It is not anticipated that any remedial activities will be classified as a major source. The definition varies for pollutant, process and attainment status, however, most sources that generate less than 100 tons per year of a criteria pollutant are not classified as major sources.

2.2 State of Connecticut - Location Specific Standards

Listed below is the location specific ARAR analyses for State of Connecticut requirements.

Inland Wetlands or Watercourses **Potential ARAR**

22a-39-1 through 15 RCSA

Under these laws the CTDEP, or a municipality that has adopted its own wetlands program may regulate "any operation within or use of a wetland or watercourse involving removal or deposition of material, or any obstruction, construction, alteration or pollution, of such wetlands or watercourses".

The Thames River and designated inland wetlands are shown in Figure D-1. The following sites contain inland wetlands: Area A and Overbank Disposal Area. As such, if remedial activities constitute regulated activities under these rules and regulations, they will be ARARs.

Tidal Wetlands **Not ARAR**

22a-30-1 through 17 RCSA

The CTDEP regulates activities in the tidal wetlands under these rules and regulations. A permit must be obtained from CTDEP prior to conducting a prohibited activity. The following

activities are prohibited: draining, dredging, excavation, or removal of soil, mud, sand, gravel, aggregate or rubbish of any kind; or dumping, filling, or depositing thereon of any soil, stones, sand, gravel, mud, aggregate of any kind, rubbish or similar material, dumped either directly or otherwise; or the erection of structures, driving of pylons, or placing of obstructions, whether or not they change the tidal ebb and flow.

There are no designated tidal wetlands at NSB-NLON, therefore, these rules are not potential ARARs.

Sanitation of Watersheds, 19-13-B32 RCSA — **Not ARAR**

These regulations concern watershed areas and specify set-back distances, and have disposal prohibitions into watercourse tributaries to public water supply. As the NSB-NLON has no public water supplies onsite, nor is it tributary to any water supply areas, these regulations are not potential ARARs.

Agricultural Lands Preservation, 22a-26gg-1 through 8 RCSA — **Not ARAR**

These regulations regard preservation of historical farmlands and the processes to change land use designations. None of the investigation sites at the NSB-NLON are classified as historical farmlands, therefore, these regulations are not potential ARARs.

Connecticut Siting Council Hazardous Waste Management Facility Siting Regulations

22a-116-B-1 through 11 and 22a-122-1 RCSA — **Potential ARAR**

These regulations contain administrative procedures for the Connecticut Siting Council regarding the issuance of certificates of public safety and necessity to new hazardous waste disposal facilities. Within the regulations are minimum separation distances between active portions of a facility and facility property lines. As these rules only apply to new facilities, they would only apply to remedial activities at NSB-NLON if it is necessary to construct new disposal facilities. Disposal facilities are defined as incinerators, long-term storage facilities (greater than one year), or land disposal facilities.

Coastal Zone 22a-92 & 94 CGS — **Potential ARAR**

Areas located within the coastal zone boundary are identified in Figure D-1 and include the following investigation sites: Goss Cove, Former Gas Station, Lower Base and DRMO. As such, any remedial activities directly affecting the coastal zone must be done in a manner consistent with Connecticut's Coastal Zone Management Program.

Connecticut RCRA Program 22a-449(c) 100 through 110 RCSA — **Potential ARAR**

See discussion on federal RCRA standards. There are no significant differences regarding location standards between federal and state regulations.

Stream Channel Encroachment — **Not ARAR**

22a-342 to 350 CGS

These statutes prohibit the establishment of any obstruction or encroachment, without a

permit from the DEP, within designated stream channel encroachment lines. There are no stream channel encroachment lines established in this section of the Thames River. As a result, these standards are not potential ARARs.

Aquifer Protection Areas **Not ARAR**

22a-354a through 356 CGS

These statutes provide for the municipal regulation of various activities in aquifer protection areas. These statutes came from public acts 88-324, 89-305, and 90-275. As of this date regulations and mappings under this statute are not complete. The NSB-NLON property is not presently an existing well field and to date has not been identified as a potential well field area. As such, any future regulations would not be ARARs.

Regulation of Dredging and Erection of Structures and Placement of Fill in Tidal, Coastal or Navigable Waters **Potential ARAR**

22a-359 through 363 CGS

These statutes control activities in navigable waters of the state waterward of the high tide line. It is unlikely that remedial activities that constitute regulated activities under this statute will take place. Regardless, as the Thames River is a navigable waterway, there is a potential for such activities as a result this statute is a potential ARAR for sites adjacent to the Thames River.

Storage of Hazardous Substances Near a Watercourse **Potential ARAR**

22a-134p CGS

This law regulates storage of hazardous substances pursuant to Section 302 of the Emergency Planning and Community Right-to-Know Act near watercourses. The Thames River is a watercourse. Regulations have not yet been promulgated under this statute. It is unlikely that the regulations will be applicable to remedial actions at NSB-NLON as no defined hazardous substance products have been found at the base, regardless, they may be relevant and appropriate to the extent that they will specify best management practices for the storage of hazardous substances.

3.0 ACTION SPECIFIC ARARS

Action specific ARARs cannot be specifically defined until remedial alternatives have been selected during the Feasibility Study. When the detailed analysis of alternatives is made during the Feasibility Study, action specific ARARs can be defined. This list was compiled with the understanding that there are no asbestos, radioactive materials, or pesticides present onsite except for the presence of DDT and its metabolites in soils.

3.1 Federal Action Specific ARARs

Listed below is the action specific ARAR analyses of federal requirements.

Federal RCRA Hazardous Waste Regulations **Potential ARAR**

40 CFR 260 through 272

The only contaminants at the Navy Subase that originate from listed hazardous wastes are the organic solvents detected in soil and ground water near Building 79. The only areas containing characteristically hazardous waste are the Lower Base, DRMO and the Spent Acid Storage and Disposal Area sites. In these three areas, soils contain TCLP lead concentration above the regulatory threshold. These regulations govern the generation, transportation, treatment, storage or disposal of those soils or ground water. RCRA will be applicable, or relevant and appropriate to wastes removed from these three sites. The disposal standards would only be applicable onsite if the waste was excavated and redeposited onsite as these wastes were deposited prior to the implementation of the RCRA regulation (11/19/80).

Federal RCRA Underground Storage Tank Regulations **Potential ARAR**

40 CFR 280

These rules govern corrective actions for leaks from underground storage tanks. These requirements will be applicable to several of the underground storage tanks and relevant and appropriate to underground storage tanks that are exempt from these regulations, i.e., those used solely for onsite heating. Strictly speaking, CERCLA only regulates hazardous substances. Oil is not classified as a hazardous substance under CERCLA. Regardless, the Naval Installation Restoration Program does address oil and petroleum contamination.

Federal RCRA Standards for Solid (Non-Hazardous) Waste Management **Potential ARAR**

40 CFR 240 to 257

To date, these regulations consist of a set of recommended procedures. This may change with future rule makings. These future recommendations may be applicable to any new solid waste disposal area and relevant and appropriate regarding any solid waste that is to remain in place.

USEPA Underground Injection Control **Potential ARAR**

40 CFR 1144 through 147

These rules would only be an ARAR if any of the remedial actions selected constitute underground injection. It is not likely that underground injection will be used at this site.

DOT Hazardous Materials Transportation **Potential ARAR**

49 CFR

For sites containing hazardous materials, these regulations may be ARARs if such hazardous materials are transported. The only sites with hazardous materials present are the Lower Base, DRMO, and the Spent Acid Storage and Disposal Area sites. At these sites, hazardous wastes which are classified as hazardous materials are present.

OSHA Standards, 29 CFR 1910.120 — **ARAR**

As this is a federal Superfund site, these regulations are applicable to all investigation and remedial activities at the Naval Subase.

USEPA - NPDES, 40 CFR 122 through 125 — **Potential ARAR**

NPDES (National Pollution Discharge Elimination System) permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs.

USEPA and Army Corps of Engineers Rules Regarding Activities in Wetlands and Watercourses — **Potential ARAR**

33USC 404, 33 CFR 320-330, 40 CFR 230

Certain activities such as dredging and filling in wetlands and watercourses require federal permits from the Army Corps of Engineers and the USEPA.

USEPA Review of New Sources and Modification — **Potential ARAR**

40 CFR 60

These standards would only be ARARs if any remedial treatment technologies are classified as major sources. All major new sources require permits. It is unlikely that any remedial activities will be classified as major sources.

USEPA PCB Regulations Under TSCA — **Potential ARAR**

40 CFR 761

These standards are potential ARARs at any site containing PCBs. The regulations govern, among other things, the storage, transportation and disposal of PCBs, and the cleanup of PCB spills. For the most part, these standards only apply to PCB items with concentrations above 50 ppm or to materials contaminated from such items. Several areas contain detectable levels of PCBs. None of these areas contain PCBs above 50 ppm. It is believed that the PCB contamination in Goss Cove, DRMO and Area A Landfill resulted from the storage of transformers containing greater than 50 ppm of PCBs. At the Torpedo Shop, the source of PCBs is unknown.

For the above listed sites, if contaminated soils are removed, the storage, transport and disposal requirements in the TSCA regulations would be ARARs.

National Environmental Policy Acts (NEPA) — **Potential ARAR**

NEPA requires analysis of environmental impacts and consideration of alternatives for significant activities that are federally sponsored. Any remedial actions that constitute significant activity would make NEPA an ARAR.

3.2 State of Connecticut

Listed below is the action specific ARAR analyses of State of Connecticut requirements.

Water Pollution — **Potential ARAR**

22a-430-1 through 8 RCSA

The State of Connecticut is the authority to issue NPDES and UIC permits. In addition, Connecticut requires permits for discharges to any surface or ground waters of the state. As a result, any remedial activities that constitute a discharge to waters of the state require a permit.

Solid Waste Management — **Potential ARAR**

22a-209-1 through 13 RCSA

Solid wastes have been buried at the following sites: Goss Cove, DRMO, Area A, and OBDA, OBDANE and Bunker A-86. Therefore, if these materials are to be excavated and disposed, the new disposal site must have a permit to manage solid waste.

Hazardous Waste Management — **Potential ARAR**

22a-449 (c)-100 through 110 RCSA

These standards are nearly identical to the federal RCRA regulations and are potential ARARs for the reasons described in that section. Two additional action specific requirements of the state are that transporters of hazardous waste must have a permit, and the underground injection of hazardous waste is prohibited.

Safe Storage and Transportation of Chemicals — **Potential ARAR**

29-337-1 through 3 RCSA

These regulations directly reference 49 CFR which govern the transportation of hazardous materials. See the section on DOT hazardous materials regulations for a discussion of these regulations as ARARs.

Connecticut Siting Council Hazardous Waste Facility Siting Regulations — **Potential ARAR**

22a-116-B1 through 11 RCSA

These regulations require a certificate of public safety and necessity from the Connecticut Siting Council prior to construction of any new hazardous waste disposal facility. The term hazardous waste refers to RCRA hazardous waste and PCBs, and the term disposal means landfilling, incineration or long term storage.

Regulations for the Well Drilling Industry — **Potential ARAR**

25-128-33 through 64 RCSA

These rules apply to any new water supply or withdrawal wells; they do not apply to monitoring wells. If remediation involves installation of withdrawal wells, these rules will be applicable. The sections of these rules regarding monitoring well abandonment should be considered even though they are not applicable.

Air Pollution Control — **Potential ARAR**

22a-174-1 through 29 RCSA

Permits are required for certain stationary sources of air pollution. Any remedial activity so defined would require a permit from CTDEP.

Transportation of Oils and Chemical Liquids — **Potential ARAR**

22a-454 CGS

A permit is required from CTDEP to transport waste oils or chemical liquids.

Non-Residential Underground Storage Tanks — **Potential ARAR**

22a-449(d) RCSA

These regulations would be ARARs for any remedial activities associated with failures of underground petroleum storage tanks at the Naval Subase.

Connecticut OSHA, 31-372-101-1910 RCSA — **Not ARAR**

These regulations directly reference federal OSHA regulations, however, they only apply to state employees.

Control of Noise Regulations — **Potential ARAR**

22a-69-1 through 7.4 RCSA

These regulations have allowable noise levels based upon noise class zones. Exempted from these regulations are mobile sources and construction noise. The Naval Subase would be classified as a Class C noise zone under these regulations. Any non-exempt remedial activities would need to comply with applicable standards.

The Connecticut Water Diversion Policy Act — **Potential ARAR**

22a-365 through 378 CGS

A permit is required for any non-exempt diversion of waters of the State. To the extent that any remedial activities at this site constitute a non-exempt diversion, a permit from CTDEP is

required. A few examples of non-exempt diversions are wells, or withdrawals or discharges to surface waters greater than 50,000 gallons per day.

4.0 TBCs (TO BE CONSIDERED)

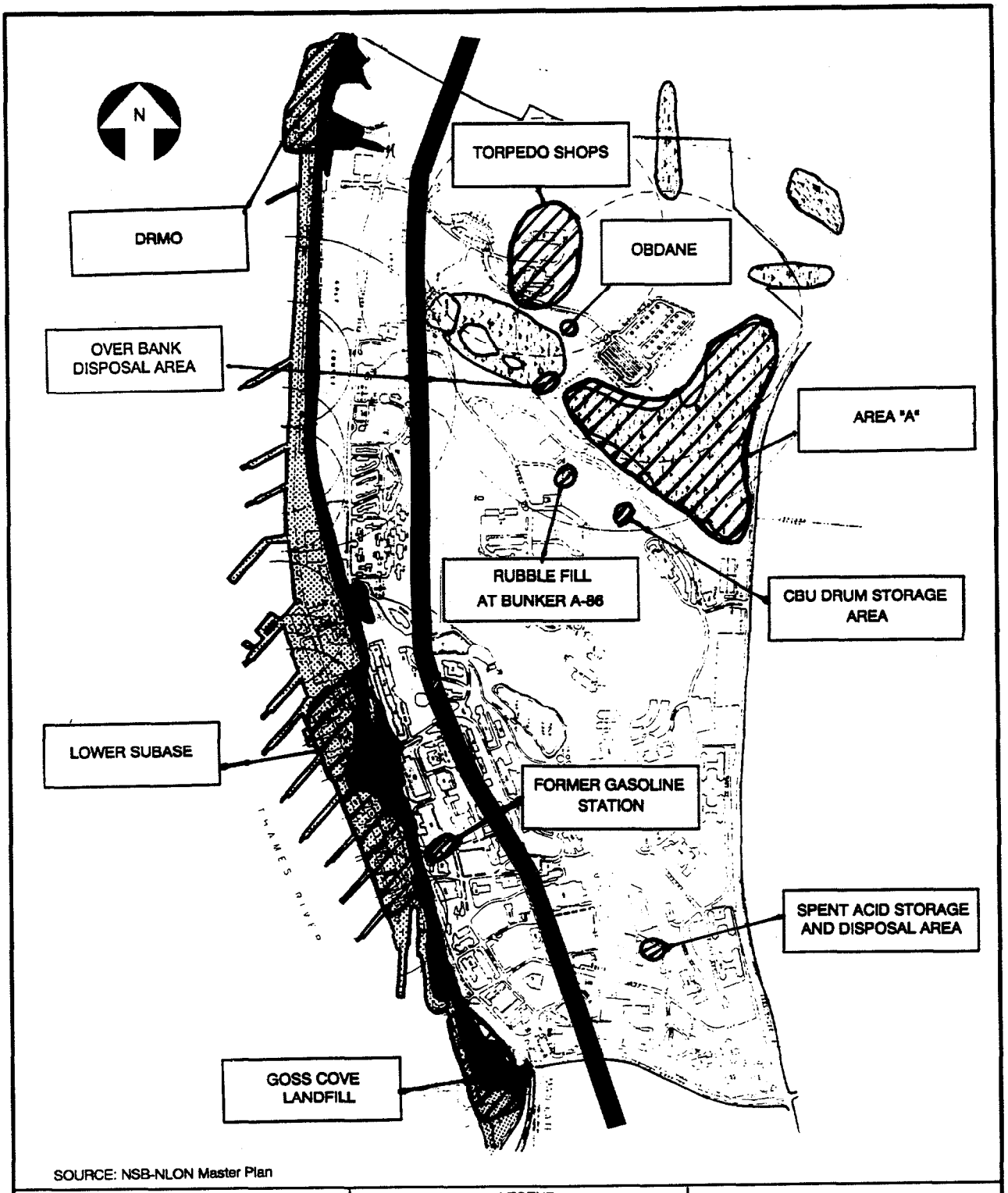
Listed below are federal and state requirements that will be considered in selection of a final remedy at NSB-NLON. Certain statutes or regulations contain both ARARs and TBCs. This list, in addition to listing requirements that are solely TBCs, details the TBC sections of the statutes or regulations that are also ARARs. Requirements that are also ARARs are so noted.

4.1 Federal TBCs

- Air/Superfund National Technical Guidance Study Series. Volume 1-4 (EPA/450/1-89/001-EPA/45-/1-89/004)
- Safe Drinking Water Act (ARAR)
    - Proposed MCLs (Maximum Contaminant Levels)
    - MCLGs (Maximum Contaminant Level Goals)
    - Proposed MCLGs
    - Secondary MCLs
    - Health Advisories
- CWA Water Quality Criteria (ARAR)
    - Standards to protect human health from water and fish ingestion
- RCRA Facility Investigation (RFI) Guidance (EPA 530/SW89031)

4.2 State of Connecticut TBCs

- Department of Health Services Action Levels for drinking water and for lead in soils under their Standards for Drinking Water Program (ARAR).
- Connecticut Department of Environmental Protection "Contaminated Soils Removal and Disposal Guidelines" under Water Pollution Control Authorities (ARAR).
- Guidelines for Soil Erosion and Sediment Control



SOURCE: NSB-NLON Master Plan

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CT

LEGEND

- Sites Investigated
- Inland Wetlands
- 100 Year Floodplain (Elev. 11 ft. MSL)
- 500 Year Floodplain (Elev. 14 ft. MSL)
- Coastal Zone Boundary

FIGURE D-1
WETLAND, FLOODPLAIN AND
COASTAL ZONE MAP

ATLANTIC ENVIRONMENTAL SERVICES, INC.